AUTOMOTIVE INDUSTRIES

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AFL to Cooperate With Outsiders

Dillon Meets Officials Of AIWA-MESA; Discuss Motor Products Strike

Special to AUTOMOTIVE INDUSTRIES

Reversing his position of neutrality and earlier refusal to cooperate with independent unions on strike at the Motor Products plant, F. J. Dillon, president of the United Automobile Workers (A.F.L.), has met Maurice Sugar, attorney of the Mechanics Educational Society, and Richard Frankensteen, president of the Automotive Industrial Workers' Association and agreed to full cooperation in the event members of his A.F.L. union vote to support strikers at a meeting called for Sunday, Dec. 8. The U.A.W. members returned to work when the management began rehiring a few days after the strike was called.

Mr. Dillon said he was compelled to depart from his neutral position by the policy and tactics being pursued by the management, its failure to provide adequate protection for members of his union and its repudiation of an alleged agreement to submit to a government supervised election to determine representation. He will lay before the workers, at their meeting Sunday, the record of the management and will ask these people to weigh the evidence and make whatever decision they desire.

"If after mature consideration, they should decide to refrain from longer working under such intolerable conditions and until such time as the management is prepared to sit down around the table and discuss to a mutually satisfactory conclusion the grievances of these people, they shall have the whole-hearted and unqualified moral and financial support of the U.A.W.," Dillon declared.

In his meeting with representatives of the independent unions, Mr. Dillon said: "We frankly explored the prob-

(*Turn to page* 745, *please*)

MESA, AAWA, AIWU Hold Joint Convention

A joint constitutional convention of three independent automotive labor groups, the Mechanics' Educational Society, Associated Automobile Workers of America, and the Automotive Industrial Workers' Union, founded by Father Coughlin, has been scheduled for Dec. 21, in Detroit. An attempt will be made by the three groups to organize for common action.

In This Issue

Four-Speed Constant-Mesh Transmission with Direct Drive Recommended 750
Trends in Air Engine Design 758
Spark-Plug Fouling Analysis 754
Fully Mechanized Heat-Treating Plant 761
Horizons of Business 748

Bearings of Cadmium Cause Metal Shortage

Plating Industry Feels Pinch; New Demand Sends Price to 85¢, May Hit $1

The great demand for cadmium for use in engine bearings has constituted one of the surprising developments in the metal market during the past season. Diversion of tonnage of this metal in that direction has actually created a shortage seriously affecting the plating industry.

Not long ago cadmium was quoted at 55 cents per pound, now, with a shortage and consequent pressure from all sides, the price has risen to 85 cents per pound, with the possibility of going to $1. If the demand for engine bearings persists or increases, the plating industry may be faced with a problem of temporary adjustment or perhaps even a shift to some other form of protective coating.

SAE Revising Nebraska Univ. Tractor Test Code

A committee of the Tractor and Industrial Power Activity of the S.A.E. has begun work on a revision of the tractor test code of the University of Nebraska. The committee is also working on tests for air cleaners.

November Sales Set New Record

Production Schedules Running Well Ahead; 350,000 Units Likely

By HAROLD E. GRONSETH
Detroit Editor, AUTOMOTIVE INDUSTRIES

While reports of retail deliveries for November are incomplete, there is enough evidence at hand to indicate that retail sales set a new all-time high for that month. What is more significant, November's volume this year appears to have gone well beyond that of any previous introductory month. Not even in the palmy days of 1929 did the January volume of new car deliveries come up to the public's response to the initial month's offering of 1936 cars. The wave of buying that followed experimental introduction of new models in the fall has exceeded the most optimistic hopes and appears definitely to have clinched the value of concerted fall announcements from the standpoint of buying response. It is the effect on used car stocks that bears watching and possibly will determine whether the plant is to be continued.

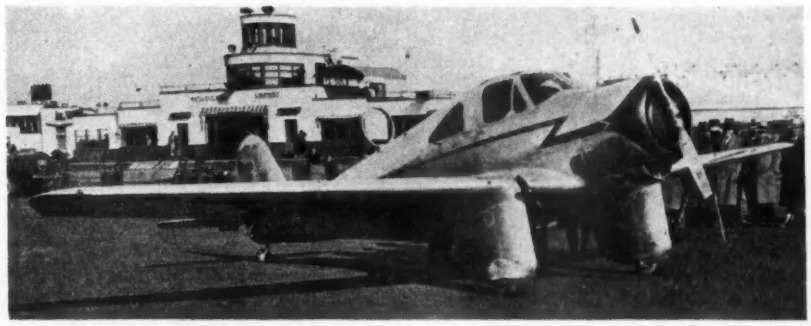
Figures thus far reported, indicate that passenger car sales last month

(*Turn to page* 744, *please*)

Chevrolet Plant Reopening Boosts Toledo Employment

Employment in 51 plants in Toledo stood at 19,031 showing a net gain of 329 for the week and indicating a gain of 42 per cent over the 13,438 on payrolls in the same plants a year ago.

Return of Chevrolet workers under the new 30-hour week plan helped to bolster the employment during the last week and Willys-Overland has been recalling men to work getting ready for new cars to come off the line about Dec. 15.



A new model all-metal construction, low-cost plane accepted by the government for experimental purposes. Wing span is 35 ft.; over-all 25 ft., 6½ in.; weight 1154 lb.

U. S. Air Corps Looks to Congress For Grant to Continue Procurement Plan

Editor's Note

Periodic alarm about the state of the national air force broke out again on Nov. 24, when the "New York Times" published an article under the heading "Army fails to add plane in 16 months." The article alleged that only 250 Army planes were efficient and criticized the procurement system of the Army Air Corps as being productive of unnecessary delays.

Army orders now on file with airplane builders were listed as follows:

Type	Builder	Engine
50 pursuit,	Consolidated	Curtis
110 attack,	Northup	Pratt-Whitney
103 bombers,	Martin	Curtis
71 observation,	Douglas,	Pratt-Whitney
26 primary trainers,	Stearman	Lycoming
30 basic trainers,	Seversky	Pratt-Whitney
18 transport,	Douglas	Curtis
80 basic trainers,	North America	Curtis

With this comment: "Some of the builders have given up hope that they will ever be told to proceed."

Telegrams from AUTOMOTIVE INDUSTRIES *to the airplane builders in the list above brought out no dissatisfaction with the Army Air Corps procurement system. Said one: "We are not experiencing any delay, being exactly on contract schedule." And another, "all materials on hand and production proceeding normally."*

From the Washington side of the question, AUTOMOTIVE INDUSTRIES *presents the considered report of L. W. Moffett, its Washington correspondent. Mr. Moffett's writing is based on statements from competent officials in the Army Air Corps, and partly on a forthcoming report by a high authority, the source of which cannot be mentioned at this time.*

BY L. W. MOFFETT
Washington Correspondent,
AUTOMOTIVE INDUSTRIES

While the Army Air Corps is by no means as deficient in equipment as some recently published reports indicate, advocates of a strong air force are hoping that the coming session of Congress will provide appropriations to form a basis for a continuing program until the required strength is attained. As a model they point to the Baker board plan, or one similar to it, recommended by General Douglas McArthur, former chief of staff, in his latest report to Congress. The approximate objective of the Baker board is 2500 planes.

In order to develop within a reasonable time an effective and balanced force with this number of planes, General McArthur said an annual procurement of 800 completely equipped planes is necessary. This takes into account the casualty rate, currently estimated at 20 per cent yearly, so that the net addition to the force would be 500 planes each year, since, as General McArthur pointed out, it is accepted as an axiom that a military plane more than five years old has almost no combat usefulness.

"While it is logical to suppose," said General McArthur, "judging from past experience in similar developments, that the useful life of these machines will increase somewhat as the industry grows older and periodic innovations are less startling, yet the fact remains that at present a complete turnover every five years is almost inescapable."

After the suggested five-year program has been completed, it was pointed out that a procurement schedule calculated to sustain both strength and efficiency should be adopted.

W. L. Batt
President of SKF Industries who was installed as ASME president at society's meeting this week

At present the Army Air Corps has 1196 planes. It also has 314 planes under construction on which delivery is expected to begin early in 1936.
(*Turn to page 747, please*)

The Dissenting View

Mitchell Charges Incompetency Hampers Aeronautical Advances

BY WILLIAM MITCHELL
Brigadier-General, U.S.A., Retired

Special to AUTOMOTIVE INDUSTRIES

Editor's Note

The opinions expressed by General Mitchell in the accompanying article, while written at the request of the Editor of AUTOMOTIVE INDUSTRIES, *are entirely his own and not a reflection of the editorial policy or views of this publication or the Chilton Company.*

The basic trouble with our aeronautics is that it has fallen into the hands of a group of aeronautically incompetent profiteers that started during the war, when, against the advice of those who knew about aeronautics and against my specific recommendations, the D. H. 4 airplane and Liberty engine were built which resulted in the deaths of numbers of our great flyers and the entire nullification of our efforts at producing suitable equipment. We had to use foreign airplanes entirely for fighting. The descendants of this group of profiteers still retain control and through their lobbies in Washington decidedly affect our aeronautical policy.

There can be no suitable development of aeronautics in this country until it is entirely removed from the Army, Navy and other bureaus and entrusted to a Department of Aeronautics in which the personnel is dedicated to the advancement of aeronautics for the nation, and not to the advancement of a few Wall Street speculators and financial manipulators. The Army and Navy can no more develop aviation to its maximum than a candle factory could have developed the electric lighting system. In fact, they have been great detriments to its progress.

The Navy sees itself destroyed by air power, which is the case, while the Army sees itself robbed of prestige and pushed back to secondary place in the scheme of defense. Every other great country has established an entirely separate governmental group for the handling of its aviation, and until we do so and use the initiative and ability of our citizens, we shall continue to be in the hands of the foreigners. In case of war against any great nation today, we would have to buy suitable equipment from other countries.

Our commercial aviation has an excellent layout of airways, airdromes and aids to aviation, but the airplanes used are not fit for our people to travel in. They should be equipped with
(*Turn to page 742, please*)

AFL-Toledo Workers' Rift Revealed By Union Attorney's Suit for Fee

A growing rift in the relations between the United Automobile Workers Federal Union No. 18384, which has members in a dozen automotive parts plants in Toledo and a membership declared to be in excess of 5,000 men and women, and the American Federation of Labor was disclosed in a petition filed in common pleas court at Toledo by Brandon Schnorf, attorney, to collect a $3,000 fee.

Schnorf represented the union at the time of the Auto-Lite strike in June, 1934, and assisted in arranging the settlements which also affected the Bingham Stamping & Tool Co., and the Logan Gear Co.

He states in the petition that the union claimed it had only $2,000 in its treasury at the time his bill was rendered. An appeal was sent to the A. F. L. for an additional $1,000 but Schnorf alleges that the check which came from the parent body was used for a union picnic rather than to pay his bill.

He asks for a declaratory judgment and an accounting by which officers of the union will be made trustees for any funds received from the A. F. L. All officers of the union are named as defendants in the suit.

"Plaintiff is informed and believes that for some time prior to the filing of this petition defendants have been negotiating with the newly organized International United Automobile Workers Federation for a new charter in said international, that it is the policy of the said international to issue separate charters for the employees of each manufacturing plant, in order to reduce the number of strikes and labor controversies, prevent general strikes, and in order to foster industrial peace in the city of Toledo and elsewhere; that defendants are endeavoring to force upon the international a plan to issue a city-wide charter for all plants in Toledo; that said negotiations are not proceeding to the entire satisfaction of the defendants; that, therefore, said defendants are planning, in the event a city-wide charter is not issued by said international, to take action authorizing the officers and trustees to dispose of the funds in the union treasury including funds held in trust for plaintiff; that there is grave and imminent danger that defendants will withdraw from the American Federation of Labor and place said funds in an independent union and attempt to place the same beyond the reach of this plaintiff."

In recent negotiations Mr. Schnorf has been replaced as counsel by Clyde Kiker, an attorney and school teacher, who was ousted from a Toledo high school for radical activities.

That present officials of the automotive union have had internal difficulties is indicated in the ousting from their executive committee of James Roland, who still served as shop committee chairman at the Chevrolet Motor Ohio Co. plant.

Roland recently told Chevrolet workers that efforts would be made to contact John L. Lewis, president of the United Mine Workers, and militant advocate of industrial unions, to get aid for the automotive workers in case of future difficulties.

It was the Toledo automotive workers who bitterly fought Francis J. Dillon, president of the international union, when that body was formed in Detroit last summer.

Local union officials have indicated they will reply to the Schnorf petition after they have had opportunity for conferences.

Fisher Guarantees Aged Workers Jobs and Wages

What to do with the younger generation in industry is more of a problem than how to care for the old, according to Lincoln R. Scafe, president of the Cleveland branch of the Fisher Body Corp. This company is taking care of its older employees by giving them easier work, and guaranteeing them 60 cents an hour for an average week of 35 to 40 hours. Mr. Scafe does not believe that the theory that men are not much use in industry after the age of 45 is true.

"The big corporation is on the spot," said Mr. Scafe. "Many men have grown old in this plant. They have been good workmen and are entitled to further consideration. When the men age to the point where they cannot keep up, we place them on easier jobs where speed is not essential."

FTC Will Seek Clayton Act Changes To Control Discounts, Allowances

Manufacturers of automotive accessories who supply mass distributors with private brand merchandise under "cost-plus" contracts, may be placed under more stringent Government regulations if Congress carries out recommendations of the Federal Trade Commission and amends the Clayton Act to compel all manufacturers to post with the commission all "special discounts and allowances which are not openly and generally made and published to the trade."

The commission's proposal, arising out of issues involved in its case against Goodyear Tire & Rubber Co., charging Clayton Act violation through alleged illegal price discrimination favoring Sears, Roebuck & Co., was made almost simultaneously with announcement of its rulings in the Goodyear case sustaining the finding of Trial Examiner John W. Bennett that Goodyear had concealed from the trade generally the terms and prices on which it sold tires to Sears, Roebuck.

The commission, Nov. 29, also sustained Mr. Bennett's finding that discrimination "to a substantial degree"

(*Turn to page 742, please*)

British and American engineers watch speedometer assembly at AC plant in Flint. Left to right they are Dr. E. A. Watson, chief engineer of Joseph Lucas, Ltd., England; Hector Rabezzana, AC chief engineer; R. E. Amidon, AC assistant foreman; Oliver Lucas (seated) managing director, Joseph Lucas, Ltd., Norman F. Stockbridge, managing director, AC Sphinx Spark Plug Co., England, and T. G. McDougal, vice-president AC Spark Plug Co., Flint.

Securities Commission Over-rules GM Protest on Salary Publication

The Securities and Exchange Commission this week over-ruled the contentions of General Motors that "as a corporation policy, it is believed that the remuneration of the corporation's administrative staff, is a personal relationship between each individual involved and the corporation itself...." and published the salaries and total income received by important GM officials during 1934 from the corporation and reported to the Commission in compliance with the Securities Exchange Act.

Under the provisions of Section 24 (b) of the Act of 1934 the S.E.C. is authorized to make public such information when in its discretion such publication is in the public interest. General Motors stated its position quite clearly in a letter to the Commission from which the above quotation is made and further said "it is not in the public interest to disclose the remuneration of individuals."

In its December, 1934, report to stockholders General Motors stated that the "executive list includes a total of 160 individuals. As so defined, it involves a cost equivalent... to seven cents per share on the common stock outstanding." The corporation then reported that 245 persons were receiving annual salaries of $10,000 or more. A tabulation of these salaries showed:

Salary	No.
$100,000 and over (none over $120,000)	2
80,000 to 99,999	1
70,000 to 79,999	8
60,000 to 69,999	1
50,000 to 59,999	5
40,000 to 49,999	2
30,000 to 39,999	7
20,000 to 29,999	34
15,000 to 19,999	55
10,000 to 14,999	130

In its letter to the Commission the corporation pointed out that it believed publication of executive salaries is not only highly undesirable but "contrary to the interests of the stockholders. . . . On the other hand, it is recog-

(Turn to page 744, please)

Sept. Daily Average Gas Consumption Rose 7.63%

September consumption of gasoline in this country showed a slight decrease from the August volume and an increase of slightly better than 100,000,000 gal. over the September, 1934, consumption. The consumption for the first nine months of this year rose 760,534,000 gal. above that of the corresponding 1934 period.

Statistics compiled by the American Petroleum Institute show September's consumption to be 1,603,291,000 gal., a daily average of 53,443,000 gal. or 7.63 per cent gain over the previous September, when the monthly consumption was 1,489,678,000, with a daily average of 49,656,000 gal. August's totals were 1,744,505,000 gal. with a daily average of 56,274,000 gal. During the January-September period the total consumption was 13,124,237,000 gal., with a daily average of 48,074,000 against respective gallonage of 12,363,703,000 and 45,288,000 for the corresponding period last year. This is a gain of 6.15 per cent in the daily average.

Goodyear Labor Scrap Referees Complete Quiz

The three members of the special commission named by Secretary of Labor Frances Perkins to study and report upon the wage and hour controversy between the management and employees of the Goodyear Tire & Rubber Co., completed their hearings in Akron last Monday and returned to Washington. Their report is expected to be filed with the U. S. Labor Department shortly. Members of the commission were Dr. Fred C. Croxton of Columbus, chairman; Dr. John A. Lapp of the Petroleum Labor Policy Board and Hugh S. Hanna of the Department of Labor. They interviewed Goodyear officials, officers of the Goodyear employees' "Industrial Republic," and officers of the Goodyear local, United Rubber Workers Union, A. F. of L.

Waste Aided Carrier Act Passage—Eastman

"Regulation of highway motor carriers, when first proposed, was regarded by many as a mere device to protect railroads against unwanted competition, but the Motor Carrier Act which became law last summer and provides for such regulation, in the end had the support, not only of the railroads and their employees, but of the national associations of the motor bus and truck operators and many shippers," said Joseph B. Eastman, Federal Coordinator of Transportation, in his address before the annual conference of the Associated Business Papers, Inc., at the Waldorf-Astoria Hotel in New York last Monday.

Such regulation became necessary be-

(Turn to page 749, please)

Berry Outlines Conference Program

Major George L. Berry in his official capacity of Coordinator for Industrial Cooperation under the National Recovery Administration has admitted NRA is dead. The Major's admission came this week while outlining the tentative agenda for his industrial conference scheduled to open in the Capitol, Monday, Dec. 9. Questions of unemployment and business taxation will principally be discussed.

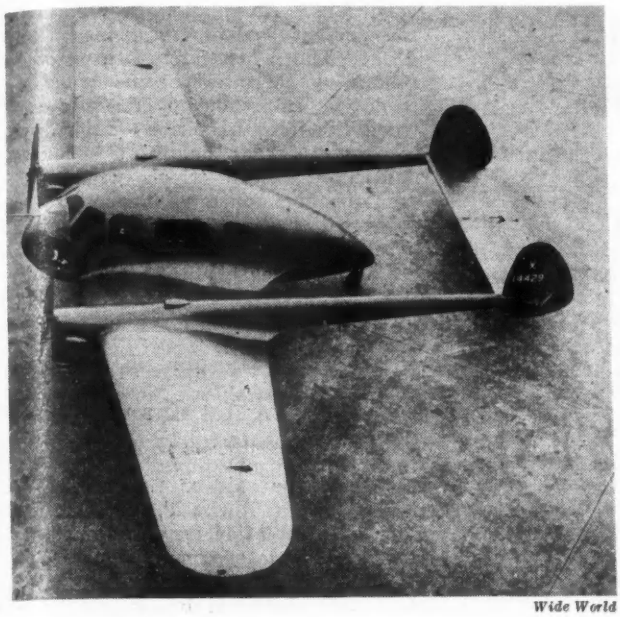
"NRA is dead indeed," the Major said. "No one faces that fact with more conviction than I who devoted my time without Government compensation for two years to the battle to keep it alive and make it function."

While discussions of problems of unemployment and taxation are to form the central theme of the Monday meeting, the exact nature of the discussions was not made clear. But reports are current that industry will be asked to accept some form of a "quota" system for taking up unemployment and also that it will be urged to voluntarily shorten hours. It appears conclusive that organized labor will give strong support to the shorter hours idea. There also appears to be some evidence, according to reports in administration circles, that the "quota" system for absorbing the unemployed has some business backing. Such a plan, it is understood, would be based on employment in some peak year, such as 1929, and industries and their units would be "allocated" their proportion of unemployed labor to absorb and at the same time reduce working hours so that production would not suddenly get out of bounds in relation to demand.

At the same time Major Berry was outlining his ideas for the coming conference Secretary of Commerce Roper was meeting with his Business Advisory Council discussing ways and means to regain some of the lost cooperation of business with the present administration. At this meeting the council adopted a report proposing that it should advise on activities of the Department of Commerce through the medium of subcommittees under a general committee in departmental problems, and that study and reports on specific problems of economic and general business importance such as long-time economic planning and similar matters should be assigned to various council committees.

Two major resolutions were adopted by the council: one proposing that the present skeletonized personnel of the NRA be transferred to the commerce department and the other endorsing the view expressed by Secretary Roper in an address before the Associated Grocery Manufacturers of America on Nov. 13. In this address Mr. Roper said the Government should not say how the business of the nation is to be run and "will not if wise business assistance in regulations can be secured and can be accepted by business, and through their assistance, put into operation."

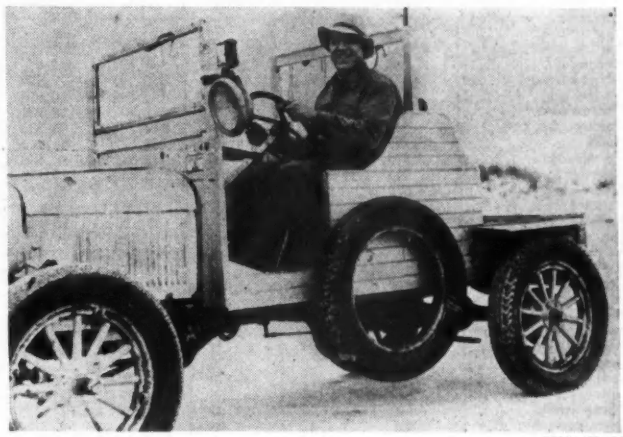
The World On Wheels



Wide World

A new plane by the American Gyro Co. powered by a supercharged Menasco engine rated at 150 hp. at 2300 ft. altitude

Richard Crooks, opera star, designs his own "beach buggy" to reach his secluded New Jersey fishing shack

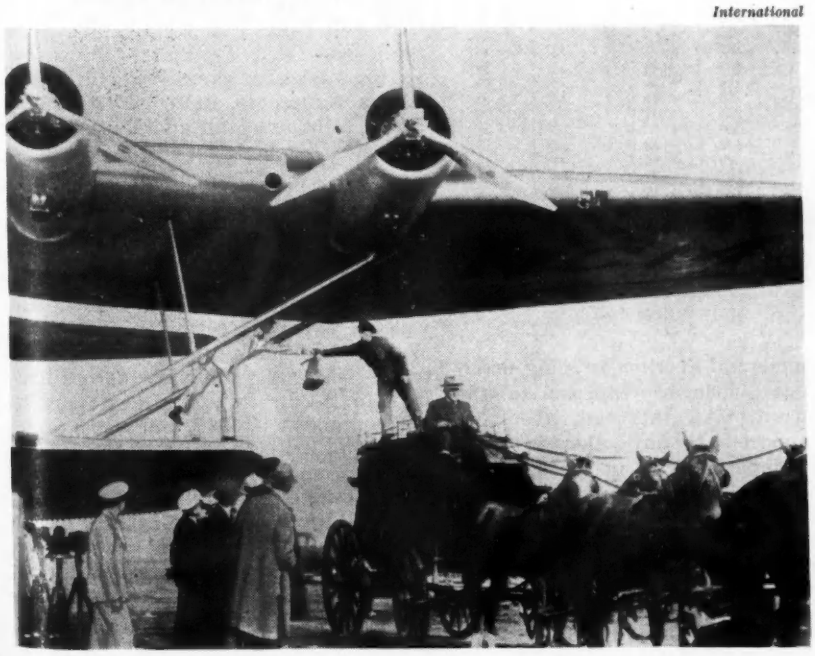


Wide World

International *Wide World*

British troop plane and long range bomber equipped with two 14-cyl. engines of 860 hp. each and armed with two machine guns in revolving, transparent turrets in front and rear fuselage

Old and new "Pony Express"—the China Clipper takes mail from an old stage coach at Alameda airport before taking off on Trans-Pacific hop



Bus in Rome converted into wood burner as precaution against waste of gasoline in international crisis

Wide World

Packard, De Soto, La Salle Lead 10 Months' Registration Gains

NEW PASSENGER CAR REGISTRATIONS

	October 1935	September 1935	October 1934	Ten Months 1935	Ten Months 1934	Per Cent Change 10 Mos., 1935 over 1934	Per Cent of Total Ten Months 1935	Per Cent of Total Ten Months 1934
Ford	38,311	43,775	38,652	715,347	493,178	+ 45.1	31.29	28.91
Chevrolet	34,869	48,994	38,084	535,534	472,366	+ 13.3	23.42	27.69
Plymouth	16,518	17,737	22,247	320,133	277,179	+ 15.6	14.00	16.25
Dodge	7,719	7,413	6,919	145,894	80,676	+ 80.8	6.38	4.73
Oldsmobile	7,807	6,089	6,342	121,807	64,721	+ 88.1	5.33	3.79
Pontiac	8,037	7,427	4,895	117,702	66,520	+ 77.0	5.15	3.90
Buick	12,760	4,479	5,167	62,732	54,469	+ 15.3	2.74	3.19
Terraplane	2,179	2,782	3,293	43,839	36,465	+ 20.2	1.92	2.14
Chrysler	1,535	2,284	2,844	35,856	24,272	+ 48.0	1.57	1.42
Studebaker	2,575	2,726	3,094	33,607	36,936	− 8.9	1.47	2.17
Packard	4,970	2,827	636	29,000	5,473	+430.0	1.27	.32
De Soto	1,647	1,761	968	23,193	10,243	+126.0	1.01	.61
Hudson	1,030	1,061	1,526	17,419	17,377	+ 0.2	.76	1.02
La Fayette	1,492	1,920	1,066	15,207	7,642	+ 99.1	.66*	.45
Nash	1,213	1,374	1,132	14,703	12,630	+ 16.3	.64	.74
Graham	1,290	1,234	1,003	14,133	11,619	+ 21.7	.62	.68
La Salle	1,038	740	374	9,583	4,543	+111.0	.42	.27
Willys	744	594	420	8,228	6,015	+ 36.8	.36	.35
Hupmobile	426	492	616	6,607	5,251	+ 25.8	.29	.31
Auburn	358	524	651	4,830	4,703	+ 2.8	.21	.28
Cadillac	781	290	330	4,507	4,245	+ 6.1	.20	.25
Reo	288	370	310	3,372	3,358	+ 0.3	.15	.20
Lincoln	106	100	183	1,398	1,778	− 21.2	.06	.10
Pierce-Arrow	108	78	90	723	1,531	− 52.7	.03	.09
Miscellaneous	588	27	95	1,098	2,437	− 55.0	.05	.14
Total	148,389	157,098	140,937	2,286,452	1,705,627	+ 34.0	100.00	100.00
Chrysler Corp.	27,419	29,195	32,978	525,076	392,370	+ 34.0	22.96	23.00
Ford and Lincoln	38,417	43,875	38,835	716,745	494,956	+ 45.0	31.35	29.02
General Motors	65,292	68,019	55,192	851,865	666,864	+ 27.8	37.26	39.10
All Others	17,261	16,009	13,932	192,766	151,437	+ 27.1	8.43	8.88

NEW TRUCK REGISTRTIONS

	October 1935	September 1935	October 1934	Ten Months 1935	Ten Months 1934	Per Cent Change 10 Mos., 1935 over 1934	Per Cent of Total Ten Months 1935	Per Cent of Total Ten Months 1934
Ford	13,270	14,126	13,544	159,212	113,844	+ 40.2	36.01	32.42
Chevrolet	10,310	13,783	15,723	145,451	138,292	+ 5.2	32.90	39.39
Dodge..i.	7,241	5,901	4,669	52,897	39,728	+ 33.1	11.96	11.31
Interna. onal	5,845	5,199	3,238	46,014	26,421	+ 74.1	10.41	7.52
G. M. C.	1,096	1,362	1,106	9,559	8,809	+ 8.6	2.16	2.51
Diamond T	608	555	535	5,640	4,770	+ 18.0	1.28	1.36
Reo	604	427	364	4,511	4,286	+ 5.1	1.02	1.22
White	686	437	304	3,093	3,443	− 10.1	.70	.98
Studebaker	233	188	212	1,909	1,441	+ 32.2	.43	.41
Willys-Overland	218	254	2	1,881	23	.....	.42	.01
Federal	206	209	200	1,781	1,673	+ 6.6	.40	.48
Mack	503	111	146	1,634	1,616	+ 1.2	.37	.46
Brockway	143	128	118	1,054	1,064	− 1.0	.24	.30
Autocar	94	76	169	758	977	− 22.5	.17	.28
Stewart	104	94	52	704	654	+ 7.8	.16	.19
Indiana	220	110	156	694	630	+ 10.1	.16	.18
Terraplane	33	65	57	609	439	+ 38.8	.14	.13
Twin Coach	449	11	25	557	159	+250.5	.13	.05
Plymouth	48	51	11	513	108	+375.0	.12	.03
Henney	.....	3	32	323	228	+ 41.9	.07	.06
Divco	37	27	28	289	214	+ 35.0	.06	.06
Austin	5	7	24	170	424	− 59.9	.04	.12
F. W. D.	11	16	8	165	99	+ 66.8	.04	.03
Sterling	17	9	16	140	107	+ 31.0	.03	.03
Sayers & Scoville	.....	5	16	137	120	+ 14.1	.03	.03
Meteor	.....	2	13	122	159	− 23.2	.03	.05
Buick	3	1	10	111	118	− 6.0	.02*	.03
Miscellaneous	1,259	77	100	2,210	1,281	+ 72.4	.50	.36
Total	43,243	43,234	40,878	442,138	351,127	+ 26.0	100.00	100.00

Mitchell Charges Incompetency

(*Continued from page 738*)

cabin parachutes, good automatic pilots, defrosting equipment, landing sticks, engines using non-inflammable fuel and other safety accessories. Our weather service is unsatisfactory because it is not under aviation, but under the Agriculture Department. Our commercial aviation is being maintained at enormous expense to the government. All this talk about its being superior to any other is bosh. Its only superiority is in speed, which is necessary in this country and very expensive, but with it should go safety to persons in flight.

There is no one in charge of aeronautics here who has the position, power or knowledge to rectify these conditions. No small improvements in the present system can bring lasting good. The whole structure must be rebuilt by patriotic persons competent to do it. Improvement can only come when the light of pitiless publicity is thrown on every detail of our aeronautical make-up which will arouse such demand for a change that Congress will pass the necessary laws to rectify matters. This condition is a serious deficiency in our state policy and will surely result in defeat in war, as aeronautics is now the controlling element.

Seek Clayton Act Change

(*Continued from page 739*)

existed in the sale of Goodyear-made tires to Sears, Roebuck[1], and that the price discrimination was "not made in good faith to meet competition."

Commission attorneys have until Dec. 15 to file additional briefs and Goodyear has until Dec. 31 to file its final briefs. Then will come final oral arguments and the commission's complete ruling as to whether or not such discrimination as it may find has had the effect of lessening competition in restraint of trade or has tended to create a monopoly, in violation of the Clayton Act. Hearings in the case opened Jan. 15, 1934. It is the largest Federal Trade Commission case on record.

[1] See AUTOMOTIVE INDUSTRIES, Sept. 21, pp. 383.

Ford of Canada Shipping 7 Trains of Cars Abroad

Seven trainloads of 1936 Ford V-8's for export will move over Canadian railways from the factory at Windsor, Ont., to Canadian seaports during November and December, Wallace R. Campbell, president of the Canadian company, announced this week. This is the heaviest trainload movement for export in the company's history, Mr. Campbell said, and will include more than 5000 Ford V-8 units. Shipments go to Australia, New Zealand, South Africa, Singapore, British East Africa, India, Newfoundland and British West Indies.

John D. Cormack

Dr. John Dewar Cormack of Glasgow University, one of Scotland's foremost engineers, died at Glasgow Dec. 1. He was 69 years old. During the World War Dr. Cormack served as chief contracts officer for military aeronautics in 1915, as director of aircraft supply and equipment in 1917, and was a member of the British mission to the United States from 1917 to 1919. At a dinner in Washington in December, 1918, Dr. Cormack pronounced the Liberty motor "the finest feat in design and production that has been accomplished during the war, so far as aircraft matters are concerned."

Buffer Buying Fogs Steel Price Rise Issue

First Quarter Increase Remote if Finishers Can Fill Needs at Old Rates

If the $2 per ton advance for first quarter bookings of semi-finished steel, which was announced several weeks ago, falls by the wayside and non-integrated rolling mills will be able to cover their requirements at the prices which have heretofore been in effect, it will be taken for granted in the steel market that the possibility of a sudden change in finished steel prices has become more remote. So far the advance in semi-finished steel prices has been nothing more than a gesture, the finishing mills that buy sheet bars, billets, wire rod, etc., from primary mills being adequately covered at old prices. Until it is definitely known, however, whether the advance will become a nullity, more or less uncertainty surrounds the outlook for finished flat steel prices.

With announcement by the leading interests' sheet subsidiary that there would be no change and that first quarter commitments were acceptable at old prices, the competitive undercurrent of the market became decidedly stronger. Some of the "independents" had been so certain that their viewpoint of higher prices being a necessity would prevail that they had engendered considerable protective buying. In some quarters, it is pointed out that it was because of the extent of this business that those who frame the leading interests' price policies saw too great a risk in announcing an advance at this time, when some of the large automotive buyers might have turned their backs on the market in view of their nearby needs having been fairly well covered.

Certain it is that there is more division on price policies in the camp of the steel producers today than there has been in a long time. Sight must also not be lost of the changed order of things with reference to price changes. Trade custom before the coming of posted prices was that quarterly prices were almost sacrosanct for that period. So far insufficient time has elapsed following the demise of NRA, to make it certain whether the old system has been fully reinstated or whether price changes may not be made without much delay whenever producers find it advantageous to revise them.

Pig Iron—A heavy movement of pig iron preceded the close of Great Lakes navigation, much iron remaining to be moved by rail during the winter. Automotive foundries, having covered all their current needs, are only buying to fill in, wanting to hold inventories down as much as possible.

Aluminum—Activity in the aluminum market is well maintained and prices are holding steady at unchanged levels.

Copper — Pressure for deliveries from manufacturers of automotive brass and copper products has eased off a bit. The copper market is fairly steady with spot electrolytic quoted at 9¼ cents, delivered Connecticut point.

Tin—On statistical reports, indicating that there will be no marked increase in the supply over the next few months, the tin market grew a shade harder, spot Straits being quoted at the beginning of the week at 51½ cents, ¼ cent per pound higher than at the preceding week's close.

Lead—Fairly active and unchanged.

Zinc—Firm and unchanged.

Kelly to Propose 4-Way Safety Plan

Driver-Vehicle Control, Publicity and Accident Analysis Basis of Idea

A four-way safety program has been developed by H. H. Kelly, chief of the Section on Safety of the Motor Carrier Bureau, Interstate Commerce Commission, for general consideration of all organizations interested in development of a highway safety program. Mr. Kelly's proposals will embrace (1) control of the driver; (2) control of the vehicle; (3) accident reports and analysis; (4) informational matter, and will be ready for discussion shortly after the first of the new year.

Under the first heading Mr. Kelly includes such subjects as hours, physical and mental fitness of drivers. The second section, dealing with the vehicle, contains recommendations for periodic inspections, adoptions of approved safety standards and necessary research work into this field. This section of the recommendations contemplates a long program with discussions on weights, speeds and standards of design and performance. The section on accidents and their analysis proposes the adoption of standard report forms of an inclusive nature which will give all necessitous detail, permitting a thorough study of an accident and determination of its cause. Mr. Kelly's fourth section is devised to give comprehensive publicity to safety work through the distribution of promotional and informatory material.

Mr. Kelly's aim in his four-sectioned recommendation is to obtain, through the adoption of such a program, some degree of uniformity of state regulations and requirements may be attained.

Cars in Lower Price Brackets Show Biggest Dollar Volume Increases

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—Ten Months

	UNITS					ESTIMATED DOLLAR VOLUME*				
				Per Cent of Total					Per Cent of Total	
	1935	1934	Per Cent Change	1935	1934	1935	1934	Per Cent Change	1935	1934
Chevrolet, Ford and Plymouth	1,571,014	1,242,647	+ 26.7	68.74	72.87	$961,700,000	$759,000,000	+ 26.9	60.96	64.26
Others under $750	323,805	74,212	+336.0	14.17	4.35	230,600,000	50,000,000	+361.0	14.61	4.23
$751-$1000	302,948	315,928	− 4.0	13.26	18.53	256,800,000	255,500,000	+ 0.5	16.27	21.63
$1001-$1500	70,592	47,567	+ 48.7	3.09	2.79	82,600,000	58,300,000	+ 42.0	5.23	4.94
$1501-$2000	5,491	12,141	− 54.8	.24	.71	9,300,000	21,100,000	− 55.9	.59	1.79
$2001-$3000	7,770	9,499	− 18.2	.34	.56	21,400,000	24,500,000	− 12.6	1.36	2.07
$3001 and over	3,755	3,258	+ 15.3	.16	.19	15,500,000	12,700,000	+ 22.0	.98	1.08
Total	2,285,375	1,705,252	+ 34.0	100.00	100.00	$1,577,900,000	$1,181,100,000	+ 33.3	100.00	100.00
Miscellaneous	1,077	375								
Total	2,286,452	1,705,627								

* All calculations are based on list price F.O.B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volumes for the different models are then consolidated by price classes.

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—October

	UNITS					ESTIMATED DOLLAR VOLUME*				
				Per Cent of Total					Per Cent of Total	
	1935	1934	Per Cent Change	1935	1934	1935	1934	Per Cent Change	1935	1934
Chevrolet, Ford and Plymouth	89,698	98,957	− 9.2	60.69	70.26	$53,700,000	$55,300,000	− 2.9	50.38	62.77
Others under $750	20,047	4,847	+314.0	13.56	3.44	14,100,000	2,800,000	+404.0	13.23	3.18
$751-$1000	25,454	31,611	− 19.5	17.22	22.44	21,800,000	23,000,000	− 5.1	20.45	26.11
$1001-$1500	10,581	3,294	+221.0	7.16	2.34	11,900,000	3,500,000	+240.0	11.16	3.97
$1501-$2000	785	903	− 13.0	.53	.64	1,300,000	1,300,000	None	1.22	1.48
$2001-$3000	825	1,001	− 17.5	.56	.71	2,200,000	1,400,000	+ 57.1	2.06	1.59
$3001 and over	411	245	+ 67.8	.28	.17	1,600,000	800,000	+100.0	1.50	.90
Total	147,801	140,858	+ 4.9	100.00	100.00	$106,600,000	$88,100,000	+ 21.0	100.00	100.00
Miscellaneous	588	79	.....							
Total	148,389	140,937	+ 5.3							

* All calculations are based on list price F.O.B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volumes for the different models are then consolidated by price classes.

Mechanization Increased Ford Employment—Cameron

"No one could remain indifferent to the charge that machinery diminished employment," said W. J. Cameron, of the Ford Motor Co., in the Sunday evening broadcast of that company. "But it has never been easy to understand how anything so useful to man could also be as harmful as was alleged."

Mr. Cameron cited the experience of his own company to judge the effect of machinery on employment, giving as an example one year when the company spent four million dollars for machinery, but increased its employees by 20,000, and its payroll by $48,000,000. In another year the company spent nine millions for machinery and increased employment by 40,000 men and the payroll by $88,000,000. That was their invariable experience—the more machinery, the more men, he said.

The experience of the Ford Motor Co. has also been the experience of the country as a whole, according to Mr. Cameron. While population was increasing 118 per cent, the proportion of employed persons increased 191 per cent, and th earlier figure included a great deal of child labor from which the latter figure is free. In 1870 it required only 324 persons out of every 1000 of population to produce what consumers demanded; in 1930, with the machine predominant, it required 400 persons out of every 1000. The charge that the machine makes fewer jobs is completely refuted, said Mr. Cameron.

November Sales

(*Continued from page* 737)

ran somewhere in the neighborhood of a quarter million. The best previous introductory month was in 1929 when 219,760 cars were registered and the biggest previous November was in 1925 when 193,922 cars were titled. The corresponding month of the industry's record year, 1929, accounted for 183,756 cars while January this year, the first month after introduction of the 1935 cars, brought registrations of only 136,635 passenger cars.

It is quite probable that many of the cars purchased in November will not find their way into registrations until this month. While Michigan was the only state to advance the date of new license sale as an inducement to earlier new model buying, five states, in which the license follows the car, normally start issuing new plates in December and one state which starts issuing March 15, makes a 75 per cent reduction available in December. A similar discount is offered by five states in October and by one state in November. New licenses are normally available in two states in October and one other, besides Michigan, in November.

Final figures being reported by the factories on November production for the most part are running well ahead of original schedules. Earlier projections have centered around 350,000 cars and trucks for the month, but it is highly probable that the complete tally for November will show that figure exceeded by a good margin, revised estimates being around 375,000 cars and trucks. Present plans are for continuation of the current rate of output through December.

Cummins on East Coast

Announcement has been made of the appointment of C. D. Cummins as Atlantic Coast manager for the Cummins Engine Co., of Columbus, Ind. Mr. Cummins is located in New York and is in constant contact with all of the Cummins distributors along the Atlantic Coast. Both sales and service problems come under his jurisdiction in that territory.

Stockholders of Allen Industries, Inc., Tuesday approved a split-up of the company's common stock on a three for one basis and the issuance of rights to stockholders to purchase 39,600 shares of new common stock.

Casualty Bureau Planning Safety Standards Meeting

The National Bureau of Casualty and Surety Underwriters is expected to send, next week, formal confirmation of invitations to participate in the development of national standards for safety in maintenance of automobiles, parts, accessories, and for inspection of cars. A group of approximately 50 organizations have tentatively been sounded out to receive invitations and includes vehicle and parts makers, large fleet users, state administrators, Society of Police Chiefs, etc. Sponsors of the move are the National Bureau and American Association of Motor Administrators; the National Bureau originated the plan. The intention is to provide codes which would be referred to, but not incorporated, in any additional state laws passed covering safety. It is not intended to freeze future development of standards by writing them into law; uniformity in standards all over the country is desired.

S.E.C. Over-rules GM

(*Continued from page* 740)

nized that the stockholders should be concerned, and have a right to be concerned as to the costs of administering the business." To make it clear to the Commission that the corporation made no attempt to conceal the real income of executives an explanation of the bonus plan was included in the letter. This plan was approved in 1918 and "reports of the corporation have always clearly indicated the amount of such bonus in the consolidated income accounts contained in the annual reports." Also the number of shares of stock awarded to employees and the number of employees receiving this stock as bonus have been shown each year in reports to stockholders.

The S.E.C. in publishing the GM executives' incomes "in the public interest" showed the total received, the salary, directorate fees and bonuses and accruals from the GM Management Corp. As reported by S.E.C. these amounts appear in the accompanying tabulation.

Name	Total	Salary	Directors' fees	1934 bonus awards provided out of 1934 earnings	G.M. Management Corp. contract accruals
George F. Baker, director	$8,762	$8,662	$100	.....	.....
Arthur G. Bishop, director	250	.....	250	.....	.....
Albert Bradley, vice-president	98,253	48,000	250	$13,228	$36,775
Donaldson Brown, vice-president	134,687	79,200	325	.....	55,162
Walter S. Carpenter, Jr., director	8,912	8,662	250	.....	.....
Henry D. du Pont, director	8,862	8,662	200	.....	.....
Irenee du Pont, director	8,912	8,662	250	.....	.....
Lammot du Pont, chairman	12,001	11,601	400	.....	.....
Pierre S. du Pont, director	8,812	8,622	150	.....	.....
Charles T. Fisher	78,840	52,800	...	26,040	.....
Fred J. Fisher	5,875	5,775	100	.....	.....
Lawrence P. Fisher, vice-president	125,218	79,200	50	.....	45,968
William A. Fisher, vice-president	110,568	64,600	...	.....	45,968
Richard H. Grant, vice-president	118,802	74,250	...	7,777	36,775
Ormond E. Hunt, vice-president	98,003	48,000	...	13,228	36,775
Louis G. Kaufman, vice-president	50	.....	50	.....	.....
Charles F. Kettering, vice-president	140,495	95,040	200	19,512	25,742
William S. Knudsen, vice-president	211,128	120,000	100	58,850	32,178
Sir Harry McGowan, director	.....	.....	...	.....	.....
R. Samuel McLaughlin, vice-pres.	24,702	24,502	200	.....	.....
James D. Mooney, vice-president	118,306	69,800	100	11,631	36,775
Junius S. Morgan, director	8,762	8,662	100	.....	.....
Charles S. Mott, vice-president	8,862	8,662	200	.....	.....
Fritz Opel, director	2,380	.....	*2,380	.....	.....
Dewitt Page, vice-president	11,200	11,000	200	.....	.....
John L. Pratt, vice-president	134,527	79,200	165	.....	55,162
Seward Prosser, director	8,987	8,662	325	.....	.....
Arthur B. Purvis, director	200	.....	200	.....	.....
John J. Raskob, director	8,812	8,662	150	.....	.....
John J. Schumann, Jr., director	71,631	41,208	250	13,992	16,181
Alfred P. Sloan, Jr., president	201,743	118,800	200	.....	82,743
John Thomas Smith, vice-president	125,212	69,800	250	.....	55,162
Alfred H. Swayne, vice-president	9,137	8,662	475	.....	.....
George Whitney, director	8,762	8,662	100	.....	.....
Charles E. Wilson, vice-president	98,018	48,000	15	13,228	36,775
Clarence M. Woolley, director	200	.....	200	.....	.....
Owen D. Young, director	150	.....	150	.....	.....

*Represents 10,000 reichsmarks paid in 1935 by Adam Opel, A. D., as director's fees covering 1934.

Responsibility for Human Progress Must Be Assumed by Industry—Sloan

Alfred P. Sloan, Jr., General Motors president, told the delegates to the American Congress of Industry, meeting this week in New York, that while gradually bettering conditions have dispelled the fear for the ability of our institutions to survive the effects of the depression "there still are lacking the assurances of a broad and definitely defined opportunity and the elimination of certain unsound economic policies, thus limiting the application of these vital principles we have always known, and retarding their ability to accelerate our economic recovery."

"I am convinced that industry's responsibilities can no longer be adequately discharged, however efficient and effective it may be, with the mere physical production of goods and services," Mr. Sloan said. "Hence I believe that the time has been reached when a much broader responsibility must be assumed. We must develop ways and means by which to better correlate the industrial machine and its component parts with the national economy as a whole, in order to more effectively promote human progress and security and to advance civilization."

To promote the general welfare of all the people Mr. Sloan pointed out that the nation must move toward a soundly based and widely distributed economic well-being—the "theory of plenty" as distinguished from the "theory of scarcity," which he held has dominated the recent economic thinking and policies. To such a platform the GM head said both labor and capital could subscribe.

A yardstick is needed, Mr. Sloan pointed out, to properly appraise and separate the proposals to promote this objective, and such a yardstick consists of the most effective balance between—first, the reduction in the real costs and selling prices of goods and services, and second, a more economic balance of national income through policies affecting wages, hours, prices and profits.

"The first presupposes that industry must strive for the most economical use of labor and material . . . to bring selling prices within range of the greatest number," Mr. Sloan said. "The second recognizes the fact that, irrespective of what we may accomplish in expanding our markets from without, we must, to the most effective degree possible, develop the greatest possible consuming power within. There lies our greatest opportunity.

"In other words, through the adoption of policies respecting wages, hours, prices and profits, and the separation of the latter between distributed and undistributed income, we must bring our capacity to consume in such relationship to our capacity to produce as will keep our wealth-creating instrumentalities virile, thus enabling them to administer effectively to the needs of the people."

Touching upon the political aspects of the problem Mr. Sloan asked: "Will our ability to promote human happiness be increased by political management of the economic order, in whole or in part?"

"I cannot see how any intelligent observer can have any possible faith in the capacity of political management to provide either stability or progress, if it should set out to operate the agencies of wealth creation, particularly industry," Mr. Sloan told his audience. "Therefore, I hold that political management, irrespective of degree, can have no other result than the lowering of the ceiling of industry's ability to contribute toward human progress. I am convinced that industry should stand united and adamant against such a proposal."

Concluding his talk Mr. Sloan said that none questioned the desirability of establishing an orderly system as proposed under social security legislation, but pointed out that "it is solely a question of constructive ways and means" and adding that "approaching it from that standpoint, industry has every reason to be alarmed at the social, economic and financial implications flowing from the social security program as finally enacted."

Industrial Union Campaign Starts Among Akron Workers

First move in a reported campaign to organize some 40,000 Akron rubber and tire industry workers into industrial unions under the leadership of John L. Lewis who recently resigned as a vice-president of the American Federation of Labor, was made Dec. 3 when Adolph Germer, organizer for the United Mine Workers of America and special representative of Mr. Lewis, addressed a large group of Akron rubber company employees. Recently Mr. Lewis cited the rubber industry as an example of the failure of horizontal unionism. Mr. Germer has been making a survey of union organizations in Akron. Leaders of local unions in Akron's major tire factories are reported favoring the Lewis plan.

AFL to Cooperate

(*Continued from page* 737)

lem and possibilities of amalgamating all independent organizations of automobile workers under the banner of the international union, United Automobile Workers of America."

Police ordered a temporary ban on picketing before the gates of the Motor Products plant after a demonstration of strikers Tuesday night, in which a score of rioters and two police officers were injured.

The management claims it has a full day force at work and that some men are working on the night shift, and that it had offered to rehire as many former workers as operations required. A considerable amount of work, however, had been sent to other plants after the strike broke out. Strikers have attempted to trace the work being sent to other shops and to induce employees in these shops to refrain from working on such jobs. Car manufacturers apparently have been successful in lining up other sources since no curtailment of operations is in evidence.

Robert Mythen, a Labor Department attache, attempted to bring the management and strikers' representatives together for a conference, but after several days' effort, left Detroit.

K. T. Keller, Chrysler Corp. president, celebrates fiftieth birthday as guest of honor at surprise luncheon given by Operations Committee. Mr. Keller is at the right; L. A. Moehring, comptroller, center, and Fred Zeder, vice-president, at left.

Tire Cos. Fight Proposed Tax Law

Manufacturing Machinery, Inventory Levies Would Double Under Ohio's Bill

Akron tire manufacturers who produce nearly 60 per cent of all tires manufactured in the United States, have thrown their support back of an organized movement to defeat possible enactment of legislation now being considered by the Ohio Legislature and which would double taxes on manufacturing machinery and inventories. If the proposed bill is enacted into law, several Ohio manufacturers who have plants outside of the State might transfer part of their tire production to these other factories, it is stated. Three Akron manufacturers — Goodyear, Goodrich, and Firestone—have large factories in California, while Goodyear in addition has a large plant at Gadsden, Ala., and controls the Kelly-Springfield Tire Co. of Cumberland, Md.

According to D. H. Miner, Goodyear tax attorney and chairman of the taxation committee of the Ohio Manufacturers' Association, enactment of the proposed legislation and enforcement of heavy taxes on machinery and inventories, would place Ohio manufacturers at a competitive disadvantage with producers outside of the State. "Steel, rubber and other industries certainly would have an inducement to produce in other States," he stated at special hearings of legislative committees in Columbus on the proposed measure.

Canadian Tariff Board Continues Motor Inquiry

The Canadian Tariff Board, now engaged in hearing the gasoline case in Ottawa, Ont., will go ahead with its inquiry into the automobile tariff, it was indicated this week. Automobile companies will have full opportunity to state their cases for the present or for more protection under the new agreement. The United States gets the intermediate tariff on motor cars, but it is not specifically limited to the "present" intermediate, if by any chance, the board should recommend an increase and it should be put into effect. On the lower tariff principle, the probabilities are against an increase, but not necessarily so if it is found to be justified.

Ford of Canada to Build Wellington, N. Z., Plant

Ford Motor Co. of Canada will begin construction immediately of a $750,000 assembly plant at Wellington, N. Z. It is to be ready for operation by July 1, 1936. Announcement was made by Wallace R. Campbell, president, following the new trade treaty between Canada and New Zealand.

Acme

Herbert Pacini

Manager of *Melbourne Sun News Pictorial* who says Australia's greatest present need is development of airways within the Commonwealth. He is now in this country.

U. S. Allots $340,000 For Inter-Highway Spans

The sum of $340,000 has been alloted by President Roosevelt from the Inter-American Highway fund for the construction of three bridges, work on which is expected to begin in the near future. The first bridge to be built will be a 450 ft. span over the Choluteca River in Honduras. The other two bridges will link sections of the highway in Panama and Guatemala.

ATAE Plans Comprehensive Program in Public Interest

A program designed to broaden and strengthen the work of the American Trade Association Executives was adopted at a recent meeting in Washington of the association's directors. Announcement of the A.T.A.E. plan was made by Pyke Johnson, president of the association and vice-president and director of the Washington office of A.M.A.

To carry out its comprehensive program the A.T.A.E. will set up several committees to deal with such subjects and problems as ethics and standards, awards, education, pensions and placement, public relations and by-laws. Mr. Johnson pointed out that his organization does not expect to perform miracles, but hopes to add something to the work of the past and build a foundation upon which can be erected a secure structure for the advancement of trade association work in the public interest.

New MEWA Members

Membership of the Motor and Equipment Wholesalers Association has recently been augmented by the addition of 12 jobbing concerns, according to an announcement just made at association headquarters.

The new members are:

Foley Auto Parts, Inc., Elizabeth, N. J.; American Gear Co. of New York, New York, N. Y.; Fifield Bros. Co., Augusta, Maine; Motor Supply Company, Lewiston, Maine; Neal Motor Supply Company, Portsmouth, N. H.; American Gear Co. of Philadelphia, Philadelphia, Pa.; The H. S. Helander Auto Supply Co., Stamford, Conn.; Northwest Motor Parts Co., Seattle, Wash.; Salt Lake Hardware Company, Salt Lake City, Utah; Storz Supply Company, Omaha, Nebraska; Waggener Auto Parts Co., Inc., Vicksburg, Miss.; Wheels, Inc., New York, N. Y.

Electrical-Load Data On 1936 Cars*

Car	Running Lighting Load Without Stop Signal Amps.	Running Lighting Load With Stop Signal Amps.
Auburn	11.4	13.9
Buick	10.8	14.8
Cadillac	11.2	15.2
Chevrolet Master	10.0	10.6
Chevrolet Standard	7.2	7.8
Chrysler 6	11.2	15.2
Chrysler 8 and Airflow	11.8	15.8
DeSoto Standard	10.8	13.3
DeSoto Deluxe and Airflow	11.4	15.4
Dodge	11.2	13.6
Ford	11.4	16.4
Graham	10.8	12.8
Hudson	11.0	16.0
Hupmobile 618 G	11.4	15.4
Hupmobile 621 N	12.9	16.9
LaFayette	10.8	15.8
LaSalle	11.2	15.2
Lincoln	12.0	17.0
Lincoln Zephyr	12.0	17.0
Nash (3620, 3680)	11.4	16.4
Nash (3640)	10.8	15.8
Olds 6	11.0	13.0
Olds 8	11.0	15.0
Packard	12.8	16.8
Packard 120	11.6	15.6
Pierce-Arrow	13.2	18.0
Plymouth	10.8	13.3
Pontiac	10.4	12.4
Reo	10.8	14.8
Studebaker	10.8	13.3
Terraplane (61)	10.0	12.5
Terraplane (62)	10.6	15.6
Willys Sedan	7.4	12.4
Willys Coupe	6.8	9.3

*Courtesy Nela Park Engineering Department, General Electric Co.

NADA Has Direct Mail Plan to Gain Members

The National Automobile Dealers' Association is developing an intensive membership campaign to be put on in cooperation with state dealer associations. The program at present includes meetings in 17 cities east of the Rockies. To promote attendance at these meetings and to follow-up on them, the association has worked out a unique direct mail advertising campaign.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

George Westinghouse, the well known inventor of Pittsburgh, Pa., is now at work on a new form of gas engine which, it is predicted, will show surprising results in economy and efficiency. Mr. Westinghouse believes the field open for the gas engine in the driving of dynamos alone is sufficient to call forth all his brilliant abilities in the effort to improve the present mode of construction.—*The Horseless Age*, Dec., 1895.

Army Air Corps Looks to Congress

(*Continued from page* 738)

These figures were submitted at a hearing at the last session of Congress.

The existing Army Air Corps fleet consists of 838 combat planes, 297 basic and primary training planes and 61 transport planes. The combat planes are divided into four categories comprising 350 pursuit planes, 130 bombardment planes, 100 attack planes and 258 observation planes. There are 153 basic and 144 primary training planes. Basic training planes are used by flying cadets at Randolph Field, near San Antonio, and those who are given first instruction in flying. Primary training ships are used at Kelly Field, in Texas, for instruction in military flying.

It is the army policy to get the best material available. It develops pilot models at proving grounds under severe tests. When "bugs" are found, the models are sent back to manufacturers. The "bugs" are taken out. Then a limited supply of such planes is given to the troops. Again "bugs" are developed, taken out, and specifications issued. There are two types of specifications, "minimum" and "desired" requirements. The minimum requirements are self-explanatory. The "desired" requirements permit any and all improvements as to speed, technical developments, etc., over the minimum specifications.

Navy Standards Rigid

Contrary to the contention that this rigid test policy unduly delays the period between asking bids on planes and making awards, it is maintained that it does not interfere with the time element and is necessary in order to assure thoroughly sound and efficient equipment.

The Navy, of course, also maintains rigid standards in its plane specifications. But inasmuch as it is naturally the first line of defense it has a more rapid purchase policy by which purchases are based on flying tests of competitive planes. The army, as the second line of defense, does not require such a policy. Moreover, the actual number of machines it purchases does not reflect its potential air strength. It can be increased rapidly and efficiently. For once orders are placed, the manufacturers, having the specifications, prepare blue prints and make the necessary dies and gages which in the event of emergency can be distributed to other makers and thus assure quick mass production. As pointed out by General McArthur, the United States enjoys industrial advantages which would enable it, in war, to produce more planes than any other nation in the world.

Obviously it would be an unsound policy to acquire equipment in excess of that necessary to sustain strength and efficiency, a difficult problem. For this material rapidly grows obsolete, the rate of wastage is enormous and the unit cost is extremely high.

Daniel G. McGuire
New president-general manager of GM's Argonaut Realty Corp. and vice president of GM Building Corp.

Geschelin Will Address Business Machines Club

Joseph Geschelin, Detroit technical editor, *Automotive Industries*, will address the International Business Machines Club at Endicott, N. Y., on Dec. 10. The subject is "Behind the Scenes with the New Models in the Automotive Industry" and is intended to cover some of the activities of design, research, color and art, not generally known to people outside of the automobile plants. Among other things, this paper gives some figures relative to investment in equipment and research incident to the introduction of new lines.

Albion Buys Halley Plant

The Halley Motors plant at Yoker, England, has been purchased by Albion Motors, according to "The (British) Motor Trader." The Halley works had been closed since last September when the company went into voluntary liquidation.

Michigan Tool Expands

Contracts have been let by Michigan Tool Company for the erection of a new plant adjacent to its present factory on McNichols Road, Detroit.

Oct. Employment Rose 13.8% Over '25 Level

Reserve Board's Indexes Show Industry Payrolls, Production Near Normal

Advances made by the automobile industry toward normal levels of production, employments and payrolls is reflected in the Federal Reserve Board's indexes for October on these three items. The Board employs the 1923-1925 levels as 100 in its calculations and on this basis employment for October rose 13.8 points above the normal. While early introduction of new models and the continued retail demand for new cars were expected to lift fall employment to a higher point than customary for this time of year, such a large rise was not anticipated. The increase was more than 50 per cent above October, 1934, level.

The October payroll index moved up 45.8 points above that of the corresponding month last year and 25.7 above September, coming within 2.2 points of normal, on the 1923-1925 basis. The production index showed the smallest increase, but this can be accounted for largely in the lateness of some plants getting into production on new models and other similar retarding influences of not too great importance. Detailed figures of the Federal Reserve Board report are shown in the accompanying table.

Federal Reserve Indexes—1923-1925=100

Unadjusted

	Oct., '35	Sept., '35	Oct., '34
Production	89	50	41
Employment	113.8	91.0	74.7
Payrolls	97.8	72.1	52.0

Adjusted

	Oct., '35	Sept., '35	Oct., '34
Production	78	29	37
Employment	105.0	84.0	68.7

Divco Gets 300 Truck Order from Borden Co.

Continental-Divco Company, Detroit manufacturers of Divco house-to-house delivery vehicles and a subsidiary of Continental Motors, has received an order from the Borden Company, New York, for 300 model "S" Divcos. This is one of the largest fleet orders ever placed for commercial trucks, except for government and municipal purchases, according to Divco officials.

CALENDAR OF COMING EVENTS

SHOWS

Automotive Service Industries Show—Atlantic City .....Dec. 9-13
National Motor Boat Show, New York, Jan. 17-25

CONVENTIONS AND MEETINGS

Overseas Automotive Club, Annual Dinner, Ritz-Carlton Hotel—Atlantic City .....Dec. 11
S.A.E. Annual Meeting, Detroit, Jan. 13-17, 1936
American Roadbuilders Assoc., Cleveland .....Jan. 20-24
U. S. Chamber of Commerce, Annual Meeting, Washington .....April 27-30

The Horizons of Business

More Control

THE Canadian trade pact leaves a trail of sound and fury. The cataphonic aftermath is by no means concluded. Because the tariff is perennial in America and because it has an unquestioned relation to the economic life of the nation it qualifies as a clinical subject.

Origin of Free Trade Doctrine

The tariff is an issue upon which the economist, the politician and the business man cannot agree. The American economist has inherited his trade doctrines from the classical economists. These were without exception English and formulated what we now recognize as orthodox economic theory at a time when England was leading the Industrial Revolution, acquiring first the necessary implements and organization for specialization, applying power and using her established genius for the sea to distribute factory harvests to all quarters of the globe.

English economists at once proceeded to identify English interest with universal welfare. Granted the conditions of English business life during the first half of the 19th century no Englishman, arguing more or less consciously from direct national interest, could do anything but applaud the theory of free trade. It was an astute rationalization of English interest in terms of world well being. The demonstration of free trade by English thinkers was so convincing that Americans accepted the theory without discounting sufficiently the British self interest which made fathers of orthodox economics special pleaders.

Pragmatic Politicians

Fortunately the American politician in viewing the tariff did not rely upon authority. He knew that free trade would bring a flood of merchandise into this country which would seriously distress the workers who had to produce and sell in competition. These workers and their employers were his constituents. They elected him to office and paid his salary. He could not afford to weigh far-reaching theories. He knew that foreign goods hurt his clients whose interest was his duty. It is not surprising to note that the first bill passed by Congress was a tariff act which imposed a modest duty upon all imports.

Protection has had reputable champions such as Carey, von Thunen and List. They have always been regarded as heretics by the American scholars who received their doctrines from the English. Their works may be found in the larger libraries. Their views are not permitted to intrude upon the free trade indoctrination of the American student, undergraduate and post graduate, who takes courses in economics.

Had he been so inclined the American politician might have exhumed these authors from their arbitrary obscurity and salved his conscience with a philosophy which would have justified, on higher grounds, the action which he took to satisfy alarmed and insistent constituents.

A Local Issue

From the nature of the premises it follows that the tariff has always been a local rather than a national issue. The Canadian pact has aroused the Northwest where lumbering is a major industry. It has irritated the farmer, who sees the bars lowered for the products of Canadian agriculture. He is unable or unwilling to follow Wallace in his contention that the Canadians, the Chinese and the Scandinavians will be able to buy more of our goods, including farm products, if we accept more of their exports. The politician takes his cue from the affected interest of his own bailiwick.

Since the effect of an imported product is always direct, protection packs a stronger political punch than free trade. The chap who is injured by a grass rug imported from Japan, a pair of shoes from Czechoslovakia or a load of cement from France is always more articulate than the fellow who is benefited by a foreign market which increases his sales 5 per cent. In the latter case he will attribute the increase in sales to the quality of the product which peculiarly reflects his own ability as a producer. On the other hand if his sales suffer because of alien incursions it is clearly the fault of the state. In view of the interests involved and the frailties of human nature exposed it is surprising that the doctrine of free trade can summon the redoubtable support which it enjoys.

Leading With Its Chin

In signing the Canadian pact, whatever its ultimate virtue may be, the administration is clearly leading with its chin. Injury to American interests

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Retail trade continued to improve last week, stimulated by early Christmas shopping and more seasonable weather. Bank clearings were more than 31 per cent above those in the corresponding period last year. The greater activity in the construction and automobile industries was reflected in steel operations, which were the highest since June, 1934.

Car Loadings Continue Upward

Railway freight loadings during the week ended November 23 totaled 646,503 cars, which marks an increase of 18,173 cars above those in the preceding week, a rise of 84,561 cars above those a year ago, and a gain of 60,765 cars above those two years ago.

Waste Aided Carrier Act Passage–Eastman

by Joseph Stagg Lawrence

(*Continued from page* 740)

cause of the great waste of one kind or another which resulted from the rapid growth of our transportation facilities during recent years, according to Mr. Eastman. Competition has gone beyond normal and wholesome bounds. Each form of transportation has reached out for business which it could not handle economically, and in the pursuit of traffic, rates have often been cut below sound levels.

"While it is too much to expect that the railroads, the water lines, the buses, the trucks, the pipe lines and the airplanes will all lie down together like lambs," Mr. Eastman continued, "we may expect to see them functioning in much greater harmony than now prevails."

These and other desirable ends require some general oversight of transportation, and only the Government can supply this need, is Mr. Eastman's opinion. But public regulation, like everything else, is subject to abuse and eternal vigilance of those opposed to "regimentation" will, he hopes, enable us to steer clear of that menace. Mr. Eastman outlined the progress which he expects the railroads to make in future years, and described briefly the financial problems that must be solved before such progress may be realized.

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will be demonstrable, at least for campaign purposes. Benefits may accrue and the adherents of free trade may be trusted to make the most of them. However the most ardent free trade polemist will find it impossible to strike a direct balance between benefit and injury in the same party.

For example. The new treaty removes the Canadian duty on newspapers and magazines. The satisfaction of American publishers is understandable. The treaty permits the importation of 1,500,000 gallons of Canadian cream. Mr. Hull tells us this is only a pint of cream per person in the U. S. It is not the consumer who is adversely affected and such statistics, logically and politically, cannot take the dignified Secretary of State and his party to first base. This cream is equal to the total annual production of a thousand typical dairy farmers. It diverts from the American market a sum equal to the gross income of a thousand farm families. The action must be justified to these farmers and not to the consumers. Will these men and their wives and families be satisfied by proof that American publishers have profited to the same extent that they, i.e., the farmers, have been injured?

Political Consequences

We do not mean to imply by the foregoing that a thousand farm families will be selected by lot or isolated in some other way and their livelihood suddenly destroyed in order to leave a spot in the American market for the Canadian cream. Politically the manner of displacement will be more damaging. The milk sheds of a number of eastern metropolitan areas do not produce all the raw milk and fresh cream needed. From time to time Wisconsin ships cream to the seacoast to fill demand which tributary milk sheds cannot satisfy. Under the Canadian pact cream will be shipped from the Dominion until its quota is exhausted.

Who will explain to the curious farmers of Wisconsin the perplexing failure of cream demand from the East? Is there any doubt that vigorous sons of soil and stump will explain to their fellow farmers that a covenant, deliberately devised by the trusted fathers in Washington, has deprived them of their market—that their livelihood has been bartered for greater profits for plutocratic steel magnate and opulent publishers?

The merits of the issue are irrelevant. The fact is that an element in the administration is blithely rearranging the interests of the formidable political groups in the sincere belief that this will so redound to the general good as to still the clamor of the injured.

Morris Plan to Expand Car Financing Operation

The Morris Plan Bank announces that it will expand its operations in the financing of retail automobile sales to include New York and New Jersey. The bank's basic charge will be six per cent on one-year contracts. It is claimed that purchasers will save on the lower insurance requirements, since no collision insurance is required under the new plan.

Other features as outlined by the bank will include elimination of fixed down-payment requirements, longer terms than one year if requested, and the option to the purchaser of placing the insurance through his own broker or agent.

Young Canadian Plant Facilities Expanded

A rearrangement of their manufacturing activities is announced by L. A. Young Industries of Canada, Windsor, Ont. The Windsor plant will be rearranged for the exclusive manufacture of automobile cushion springs and parts, with enlarged quarters and a bigger staff. The Canadian head office will remain in Windsor, with C. P. Platt in charge. H. P. Parker will manage the Toronto division.

Food Prices Fall Slightly

Retail food prices during the two weeks ended November 5 declined 0.2 per cent, according to the Bureau of Labor Statistics. The decrease was the result of a decline of 3.5 per cent in meat prices and a few other smaller reductions. The current index shows a decline of 19.6 per cent below the 1923-25 average and an increase of 6.5 per cent above that a year ago.

Current Output Higher

Production of electricity by the electric light and power industry in the United States during the week ended November 23 showed an increase of 14.5 per cent above that in the corresponding period last year. The current figure marks the fifth consecutive week in which a new all-time high record was reported.

Employment Improves

According to the Secretary of Labor, the improvement in employment reported in September was continued during October. Approximately 250,000 individuals were returned to employment in October by the industries in this country. Weekly wage payments were increased by $8,200,000.

Fisher's Index

Professor Irving Fisher's index of wholesale commodity prices during the week ended November 30 stood at 84.5, as against 84.3 the week before and 85.0 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended November 27 showed an increase of $1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged. Monetary gold stocks increased $70,000,000, and money in circulation rose $81,000,000.

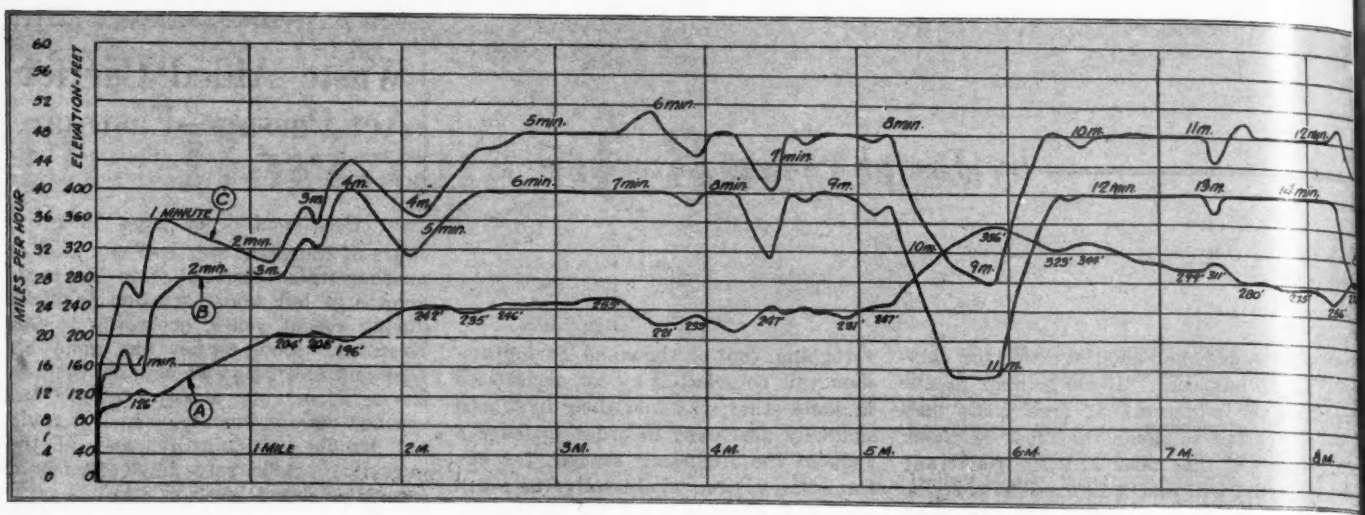


Fig. 1—Consistently higher speeds are possible in hilly country when a

Four-Speed-Constant-Mesh in Fourth Recommended

by Joseph Geschelin

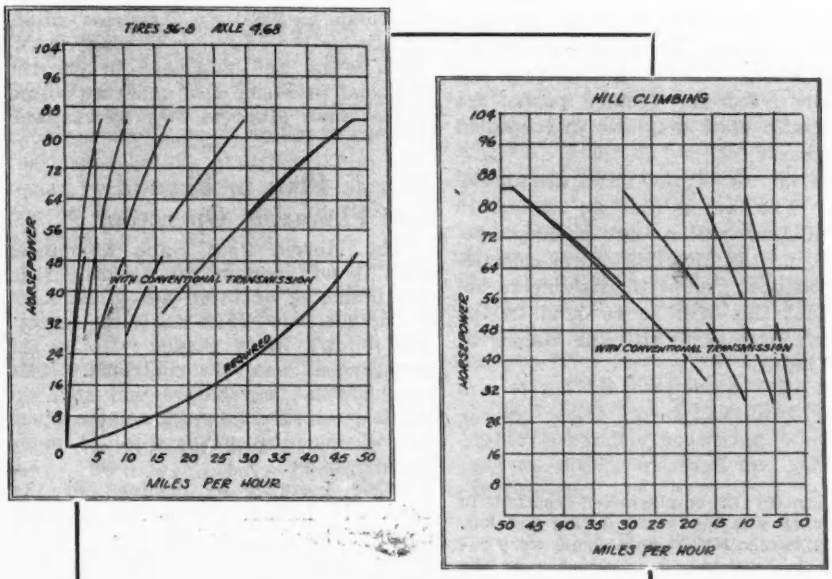


Fig. 2—The left chart shows horsepower output in acceleration and the right chart the hill climbing ability tests of a 5-ton truck of 20,000 lb. gross weight. S.R.S. motor. 86 hp. at 2000 r.p.m.

RECENT events have demonstrated that the public wants big cars, even in the lowest price brackets, but is not satisfied to swap performance for economy despite the insistence upon low fuel cost.

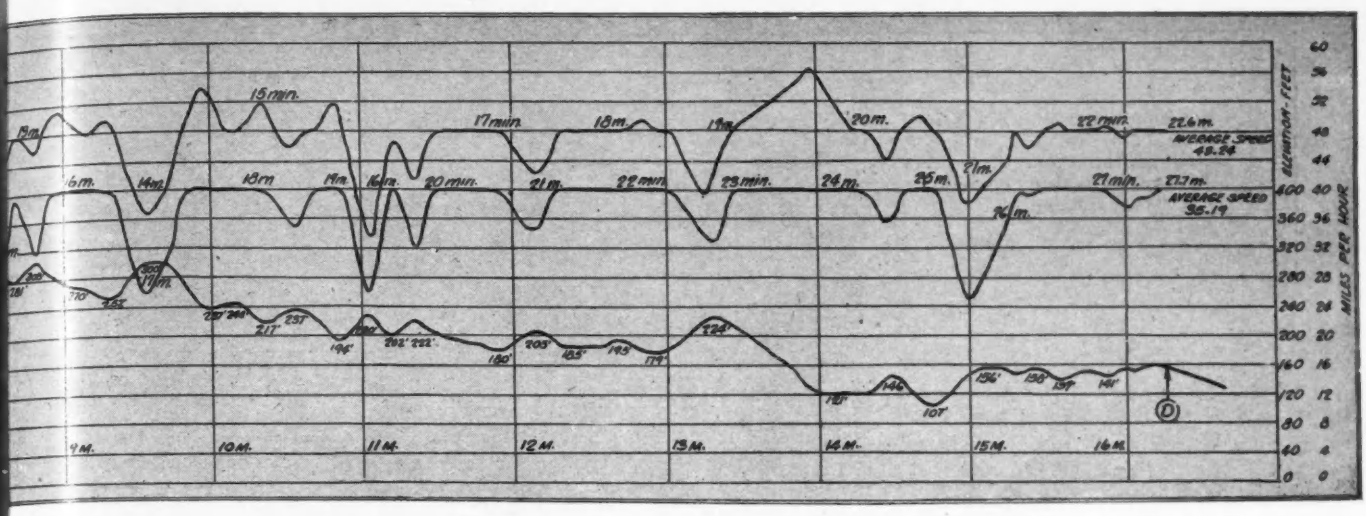
To satisfy this seemingly contradictory demand, the automotive industry has spared no effort in time and brains and money on technical improvements in that direction. Higher engine speeds, better bearings, better cooling and lubrication, improved cylinder head design, higher compression ratios, and better fuels—have been the order of the day.

And now in the midst of all this hustle-bustle comes an idea, not at all revolutionary, that promises a solution.

What will the public be willing to pay if it could make 20 to 25 per cent saving on the gas bill? Suppose it were possible to achieve this economy with conventional cars and without increasing the first cost of the car? Would the public be willing to change its driving habits only to the extent of making an extra gear shift occasionally?

All this leads to an impressive research project recently completed by one of the oldest transmission builders in the industry—the Cotta Gear Company, pioneers in the field of constant-mesh heavy-duty units. While developing a five-speed constant-mesh transmission for motor trucks and buses, Cotta accumulated some valuable data which indicate the feasibility of achieving a fuel economy of the order of 20 to 25 per cent on passenger cars when using a fast-shifting four-speed transmission properly balanced in overall gear reductions.

What Charles Cotta recommends is a four-speed-constant mesh transmission with direct drive in fourth. This would be used in conjunction with a faster rear axle ratio, the total gear reduction in third gear producing about the same effect as the present com-



rapid-shifting transmission is used, according to the above chart.

Transmission with Direct Drive for Lower Operating Cost

Detroit Technical Editor
AUTOMOTIVE INDUSTRIES

bination of axle ratio with direct in third. As will be shown later, reductions in the transmission as well as the rear axle ratio are selected in such manner as to take best advantage of the characteristics of the powerplant.

An essential ingredient of the set-up is a gearbox design that permits fast shifting with the greatest of ease.

Cotta's got their slant on this from a series of tests conducted on heavy-duty trucks. In analyzing some typical units, they found that engines deliver approximately 55 per cent of rated horsepower at governed speed when accelerating and hill climbing. With the proper balance of transmission ratios they were able to utilize almost 85 per cent of engine rated horsepower output under the same conditions.

This is demonstrated in Fig. 1 which shows the results of tests with two trucks of the same make, size, and weight, on a hilly stretch 16¼ miles long. Curve A shows the terrain, based on topographical data from the State Highway Department. Curve B shows the performance of the 5-ton truck of 20,000 lb. gross weight, with conventional five-speed transmission, where speed changes are made at relatively low engine speeds. Curve C shows the advantages to be derived with the same type of vehicle equipped with a Cotta five-speed, rapid-shifting transmission, where speed changes can be made at near the governed speed of the engine.

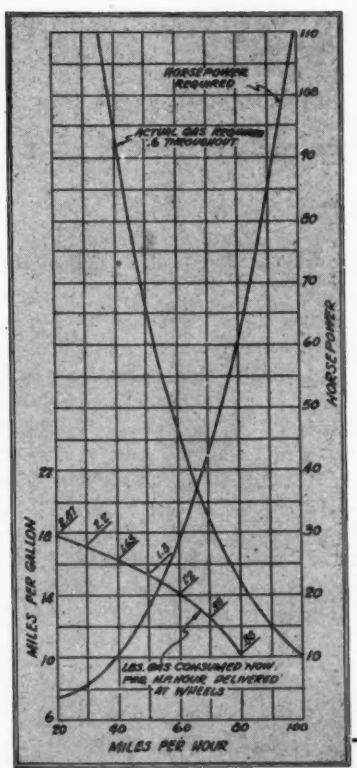
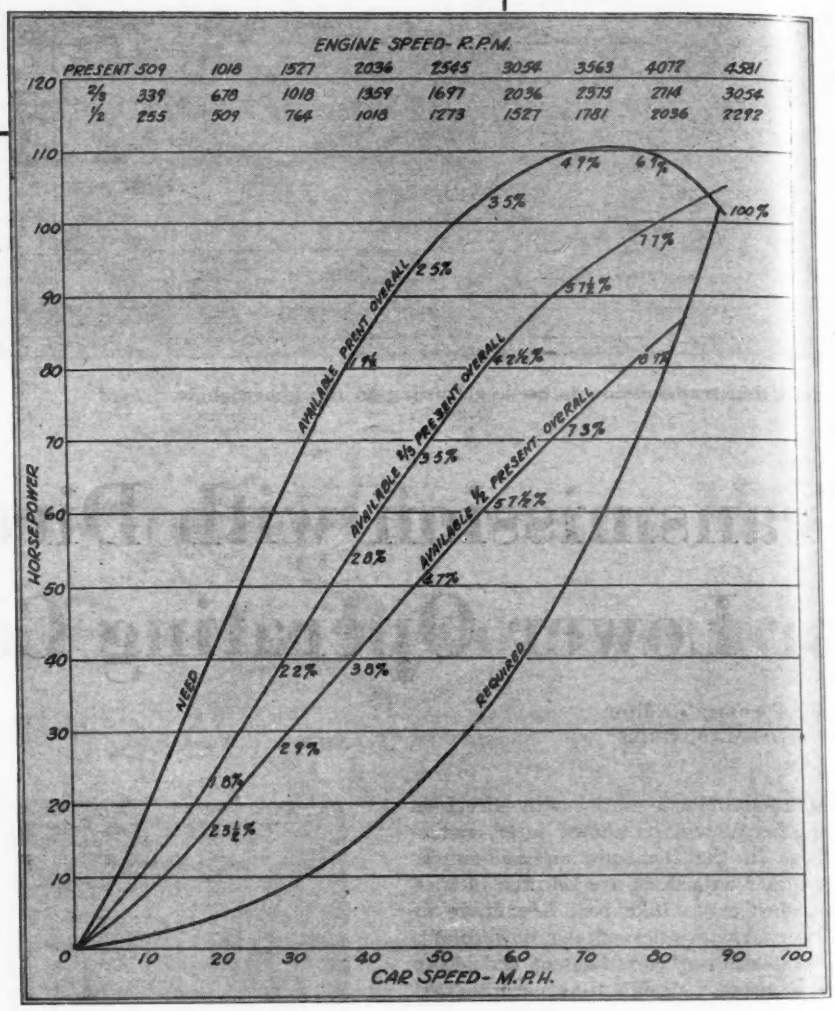


Fig. 3—Miles per gallon possible with a 3500-lb. car assuming 100 m.p.h. and 100-lb. air pressure at 50 m.p.h.

The chart shows that the truck equipped with a conventional transmission arrived at its destination in 27 minutes and 7 seconds, while the sister truck with the Cotta transmission arrived at its destination in 22 minutes and 6 seconds, a saving of 5 minutes and 1 second in 16 miles of travel, which represents an increase of 22½ per cent in ton-mile ability. This also resulted in over 20 per cent more miles per gallon of gasoline.

The reason for the improved performance, according to Mr. Cotta, is found in an analysis of Fig. 2. The lower group of curves represents speed changes with a conventional transmission, shifting at low engine speeds and utilizing only a fraction of the available engine power. The upper group shows the result of using a fast-changing reduction unit in which all speed changes are made at maximum hp. output of the engine, producing an in-

Fig. 4—Curves showing what can be done with a conventional engine when the over-all gear reduction is better balanced



crease of over 80 per cent in engine power utilization. By running the engine at about its most efficient operating range, improved combustion and increased fuel economy are obtained.

To carry this analogy still further, a five-ton truck was tested with a series of different rear axle ratios, keeping the engine at the same governed speed. The operating figures are given in the following tabulation:

Axle Ratio	*Vehicle Speed M.P.H.*	*Economy M.P.G.*
8.64	27	5.77
5.88	37	6.5
4.68	48	7.5
3.96	56	8.65

It will be seen that with the fast axle, which more than doubled the speed, the economy was increased by 50 per cent.

Some preliminary road testing of passenger cars show that a similar improvement in fuel economy may be expected with the use of a fast-shifting four-speed transmission with transmission and rear-axle reductions balanced to take full advantage of the powerplant.

In Fig. 3, Mr. Cotta has given the ideal, and what he feels to be the commercially possible, fuel consumption figures for a well-known passenger car in the medium-price field. The lower curve shows the actual fuel consumption in lbs. per bhp.-hr. as taken from dynamometer tests. The upper diagonal curve indicates the possible fuel consumption economy in miles per gal. based on a constant combustion efficiency of 0.6 lb. per bhp.-hr.

Fig. 4 indicates what can be done with a conventional engine when the over-all gear reduction is better balanced. The upper and lower boundary curves, respectively, indicate the available power and power required to propel the car at various speeds. The two inner curves show the power available with an over-all reduction of 2/3 and ½ of the present reduction, respectively, in direct gear. Engine speeds corresponding to the present reduction, and 2/3 and ½ of present reduction are shown at the top.

It is obvious that engine speed in direct is reduced greatly, thereby improving the life of the engine and its performance. Under these conditions, the demand for extra power for hill climbing and acceleration will be met by shifting to lower gear, in this case to third gear, which might correspond to the present direct. With 2/3 of present over-all gear reduction, the car will have a somewhat higher top speed; with ½ reduction, it would have within five miles per hour of its present top speed.

While the foregoing example illustrates the performance of one specific make, it applies in kind, if not degree, to any production passenger car. The demonstration in general seems to prove that a decrease in the over-all gear ratio is accompanied by a reduction in specific fuel consumption.

The nub of the situation is the attitude of the car owner. In motor trucks it is not difficult to introduce the concept of multiple speed changes where the transmission is easy to handle and facilitate the operation of the vehicle. As a matter of fact, truck operators welcome any advance that permits better handling of the vehicle on hills and facilitates acceleration, particularly where this results in better fuel economy without penalizing the powerplant.

Not so with the passenger-car owner. Although fuel economy is recognized as an important advantage, extra gear shifting to attain it is something that must be approached through a decidedly educational process. However, Mr. Cotta believes that a demonstration of an easy shifting transmission will go far to convince any car owner.

At any rate, here is apparently a rather simple approach to improved fuel economy without the complication of costly or involved changes in conventional design. Engineers as a group should be interested in exploring its possibilities.

JUST AMONG OURSELVES

The Business Press Pools Some Views

IN New York on December second and third the Associated Business Papers (a trade association to which AUTOMOTIVE INDUSTRIES belongs as an automobile manufacturer belongs to the A.M.A.) met to consider the problems of publishing and the economic outlook.

Business leaders from many fields participated in a symposium during the meeting, which brought out many things of automotive interest. Participant Ralph Flanders, for example, stated categorically that air conditioning for motor vehicles was definitely on the way and would probably be one of the new products to which we could look for prosperity.

Mr. Flanders, as president of Jones and Lamson and of the American Society of Mechanical Engineers, named some other products, but it is significant that, as did all the other speakers, he returned again and again to the automotive industry and the pace it has set for other industries. At no time in the history of automobile manufacturing, it would seem, has the collective attention of other industries been centered on the automobile industry as now.

One speaker, however, pointed out that in industries such as those surrounding the automobile—depending upon a high rate of technological advance for success—it was necessary to guard against stagnation, both in the development of new processes and products, and from the top in the form of "mental dry rot."

In considering the general outlook for business the Associated Business Papers went vehemently on record as being opposed to the extension of government participation in business and called upon the administration to liquidate as rapidly as possible its present institutions in competition with private enterprise. Other resolutions favored the Social Security Act but asked for a further study by government agencies of the best means of making it effective, and asked for a curtailment of Federal expenditures to bring them within "reasonable and equitable" limits.

A Dagger Hides In the Muffler

THE magnitude of the loss of life from accidents involving motor vehicles has obscured a lesser menace, which nevertheless mounts. The number of deaths from absorption of carbon-monoxide from motor-vehicle exhausts has increased fourfold in a recent six-year period, and the indications are that the public has not been sufficiently educated to the dangers of the "creeping Jenny" which lurks in the thin blue smoke from internal-combustion engines.

In a mortality study just issued the Metropolitan Life points out that a closed garage accommodating one or two cars can be rendered deadly in five minutes by the exhaust of an idling engine, if the doors of the garage happen to be closed.

There is a growing interest in methods of preventing such accidents, and in the broader problem of determining how much tiny leaks of CO contribute to accidents on the road. There are indications that all "groggy" driving is not due to the influence of liquor on the driver. Some closed cars are death-traps because of faulty exhaust systems, etc. Public education seems the only general answer to the problem.

The Public Interest Stretched Once More

SOME newspaper readers of Dec. 4 were rather startled to read that the Securities Exchange Commission had released for public consumption "confidential" data filed under the Securities Exchange Act of 1934, relative to the salaries of corporate officials—including those of the General Motors Corp.

The data were filed at the time the corporations involved applied for permanent listing of their securities on the New York Stock Exchange. Upon review, the Commission decided that releasing the data would be in the public interest. This move seems clearly within the power of the Commission under Section 24 (a) of the Act [Public No. 291, 73d Congress]. It can be questioned strongly, however, whether much is served but public curiosity in the case of corporations like General Motors, which have gone already a long way to make their operations intelligible to stockholders.

Alcohol-Gasoline Data Continued

"ECONOMIC and Technical Aspects of Alcohol-Gasoline Mixtures" are reviewed by the American Petroleum Industries Committee in a voluminous document which bears the number 1378 of the committee's sequence of publications. The document is a sort of encyclopedia of the subject, and being too large for more than passing mention, is simply recommended now as being part of the required reading of those who have the slightest interest in automotive economics. Copies of the report may be obtained through this publication.—H. H.

SPARK-PLUG FOULING ANALYSIS—

by Hector Rabezzana
Chief Engineer, Spark Plug Division
AC Spark Plug Co.

THERE is considerable misunderstanding regarding the meaning and the proper use of the word "fouling" as applied to spark plugs. A fouled plug is generally believed to cause either poor ignition or complete failure of the ignition, but no pre-ignition; however, a plug can be fouled without giving immediate trouble, and that is when it is in the incipient stage of fouling.

Fouling of spark plug is so dependent on ignition efficiency that it is impossible to establish an absolute measure for it. If a fouled plug is taken from one engine and installed in another, it will often work perfectly there, even though no attempt was made to clean it when it was transferred.

The typical ignition coil or magneto is always able to generate a voltage sufficiently high to break down the normal spark-plug gap. Under operating conditions, if there is an electrically-conductive coating over the spark-plug insulator, it forms a shunt across the secondary winding which reduces the maximum voltage which the system can impress on the gap.

The coatings which are deposited on the spark-plug insulators in engine operation may be divided into two classes—those which shunt at low temperature (low engine speed), and those which shunt at high temperature (high engine speed). Typical of the coatings shunting at low temperature are the carbonaceous types; and typical of the coatings shunting at high temperature are the iron oxides and lead-dust compounds. The larger the conductance of the shunting coatings, the lower is the maximum voltage which the ignition secondary is able to impress on the spark-plug gap. Finally a condition is reached where the spark misses, because the highest voltage the coil secondary can deliver is less than that sometimes necessary to break down the spark-plug gap.

Following are the factors contributing to low-temperature fouling of the insulator and consequent shunting of the gap:

1—Unburned fuel, in liquid form.

2—Unburned lubricating oil, in liquid form.

3—Partially-burned fuel, in carbon form.

4—Partially-burned lubricating oil, in carbon form.

5—Gum in the fuel.

The following are the factors contributing to high-temperature fouling of the insulator and consequent shunting of the gap:

6—Iron oxides in fuel (rusty storage tanks, etc.).

7—Iron oxides in the mixture, due to combustion chamber or manifold rust caused by cooling water leakage or water injection.

8—Iron oxides in the lubricating oil, due to wear and corrosion of the engine parts.

9—Other metallic compounds in the products of combustion.

10—Iron carbonyl used as an anti-knock (not in this country).

11—Sulphur in the fuel.

12—Road dust.

13—Spark plug insulation resistance at its operating temperatures.

The following are the factors determining the formation of shunting coatings over the insulator:

14—Insulator temperature.

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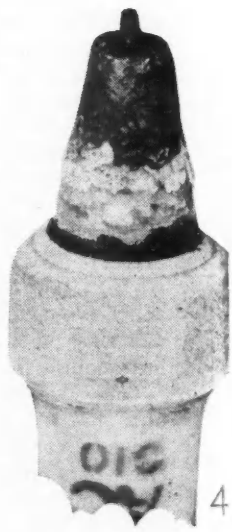
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Carbonaceous coating over insulator illustrated in Fig. 1. An insulator having iron-oxide covering, Fig. 2; Figs. 3 and 4 illustrate similar insulators with normal coating and after the car has been driven over dusty road, respectively

Establishes factors contributing to formation of conducting coatings on exposed portions of insulators; selection of plugs and their location in combustion chamber discussed

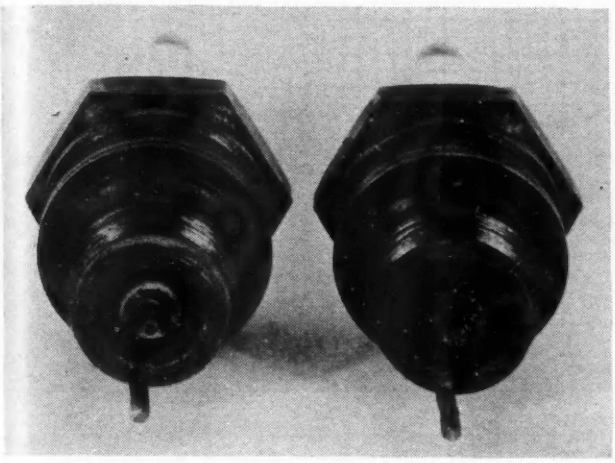


Fig. 5. Insulator with and without glaze on tip when run under same engine conditions

15—Insulator surface (material and finish).

16—Insulator shape.

17—Cooling-water temperature.

18—Air-intake temperature.

19—Cycles of engine temperature changes caused by driving conditions.

20—Temperature lag of the spark-plug insulator behind engine-temperature changes (spark-plug design).

21—Amount of burning gas flowing over the insulator (spark-plug position and clearance space around the insulator).

22—Barometric pressure.

23—Exhaust back pressure.

24—Humidity.

The secondary voltage of the ignition directly affects the performance of incipiently fouled plugs. The following are the main factors controlling the secondary voltage:

25—Breaker-point gap size and speed.

26—Battery voltage.

27—Capacity losses between secondary and ground.

The sparking voltage of incipiently fouled spark plugs may affect engine performance directly. The following are the main factors controlling sparking voltage:

28—Gas density at the gap (throttle opening).

29—Gap size.

30—Air/fuel ratio at the gap.

31—Electrode operating temperature.

32—Electrode shape.

33—Electrode material.

34—Oxide coating over electrodes.

Analysis of Fouling Factors

Factors 1, 2, 3, 4, 5—During the starting and warming-up period, the spark plug insulator may collect carbon and/or liquid fuel or oil, depending on the temperature of the insulator, amount of carburetor choking or richness, and amount of oil in the combustion chamber. A coat of dry carbon over the insulator, owing to its discontinuities, is not as good an electrical conductor as a wet one in which the divided carbon elements are electrically bridged by the liquid film; and if it is possible to run the engine long enough to warm up the spark plugs before any ignition missing occurs, the carbon coating over the insulator will disappear, by burning away, and the insulator will become clean again and ready for another fouling cycle at low temperature.

Carbonaceous coatings are generally of a transient nature, unless the gaso-

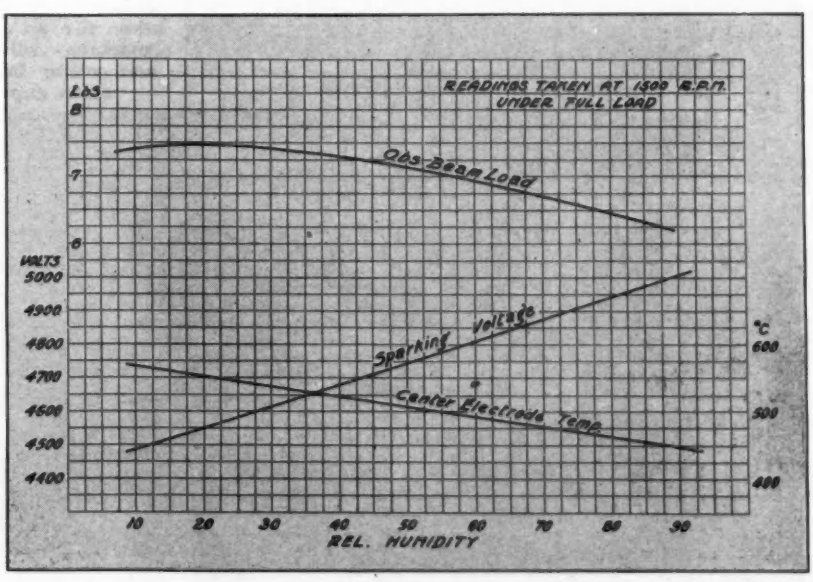


Fig. 6. The effect of atmospheric humidity on electrode temperature and sparking voltage

line contains a high percentage of gums, in which case the coating may remain permanently.

Fig. 1 shows the formation of carbon over the insulator; the insulator tip, being hotter, remains clean while the remaining portion of the insulator has collected quite a coating of carbon.

Factors 6 to 13—In a few hundred miles of alternately slow and fast driving, combustion gases will form deposits on the insulator, and the deposition will be hastened by the temperature changes of the insulator surface. This type of coating is usually a good electrical conductor at high temperature and a poor conductor at low temperature; and it is this coating that is responsible for the loss of maximum car speed.

Fig. 2 shows an insulator having an iron-oxide coating. Fig. 3 shows a similar insulator with normal coating. Fig. 4 shows the same type of insulator after the car has been driven over a dusty road. The same fuel, containing lead tetraethyl, was used in all tests. The coating shown in Fig. 3 is harmless, but that shown in Fig. 4, containing road dust, is decidedly bad, being a good electrical conductor. In a test run with ethyl gasoline the plugs showed an insulation resistance of 9 meg-ohms after six hours' operation without road dust and only 1 meg-ohm with road dust present.

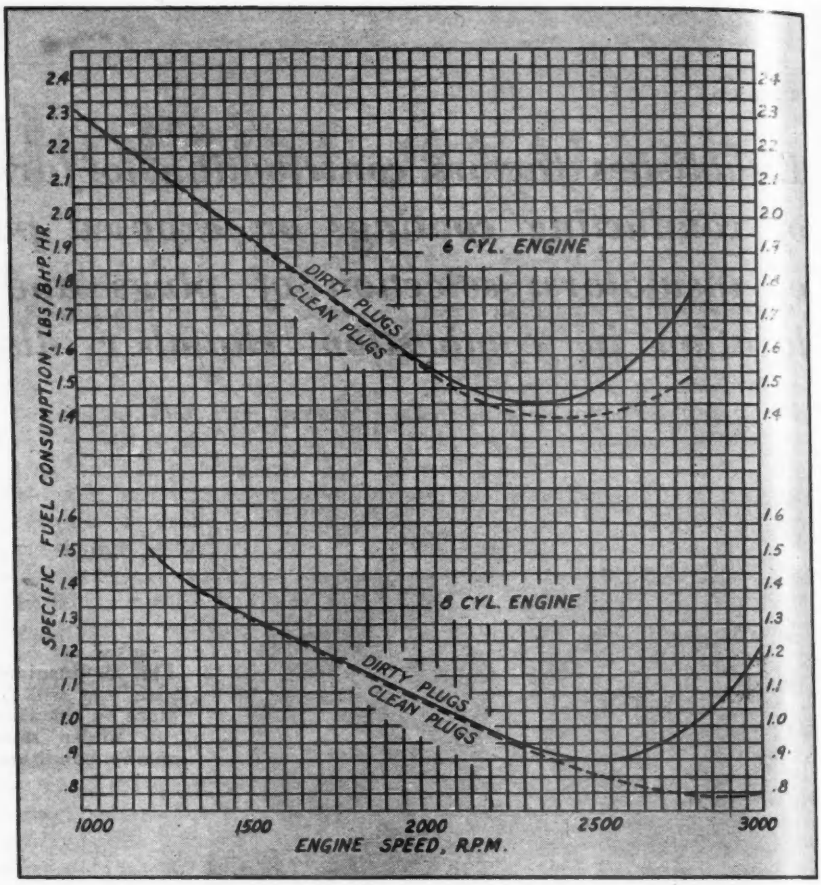


Fig. 9. Gasoline consumptions of automobile with dirty plugs and clean plugs respectively.

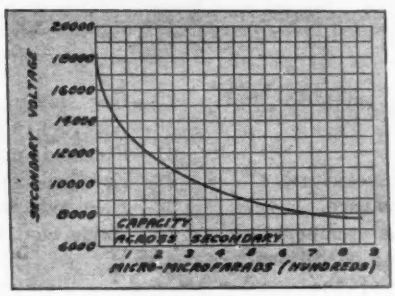


Fig. 7. Maximum conductance allowable for given sparking voltage and coil to break down gap

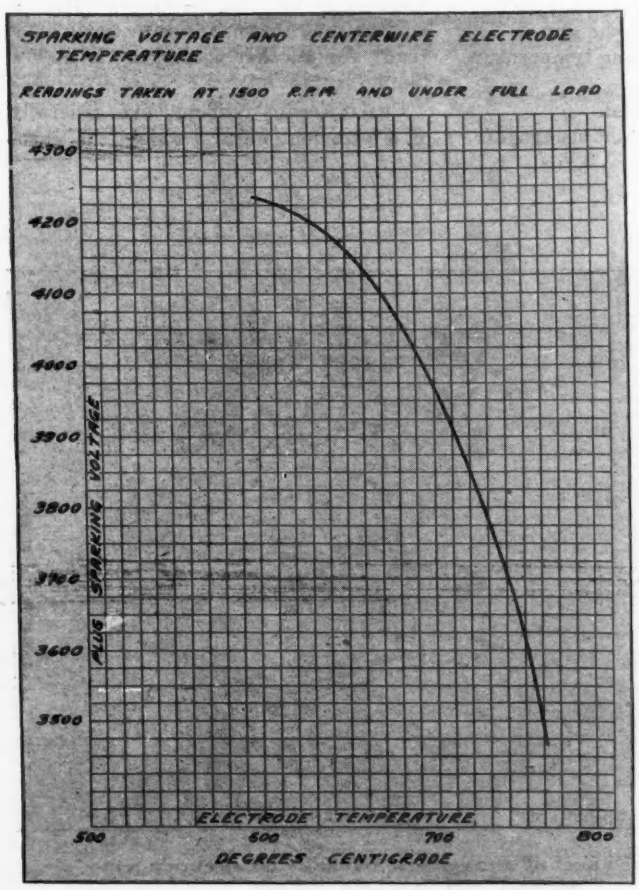


Fig. 8. Effect of electrode temperature on sparking voltage

Iron oxide is one of the worst offenders. It can be detected by a reddish color on the insulator, and as it is a very thin and smooth coating, it seems very innocent. However, such a coating is a good electrical conductor, as soon as the spark-plug insulator temperature gets into the operating range.

Factors 14 to 24.

Fig. 5 shows the insulator of the spark plug run under the same engine conditions, with and without glaze on the tip of the insulator. The glaze on the tip of the insulator has a tendency to flux with lead compounds and form incrustations that cause the tip of the insulators to become hotter, and eventually cause preignition. The glaze is quite necessary to prevent the carbon from sticking on the insulator, so that it is always advisable for best all-around spark-plug performance, to have only the tip of the insulator unglazed, and the balance glazed.

Cooling water temperature affects the spark-plug temperature. For example, a marine engine, if operated without a thermostat, so that the cylinders are kept at the same temperature as the water of the river or sea, will most likely have carbon fouling on the plugs. If the water is kept boiling, the formation or incrustation over the insulator is hastened.

The spark plug must be so chosen that the lowest operating temperature (winter time and city driving) does not continue long enough to cause failure through carbon fouling. Small-sized plugs are better, due to their ability to heat up quickly.

Spark plugs installed in the cylinder head in such a position that a lot of burning gas sweeps over the insulator are subjected more to deposits than plugs in other positions where the exhaust gas movement over the insulator is less, and the fresh gas scavenging is more active. Barometric pressure and exhaust back pressure are factors that modify the power output of the engine, and consequently the temperature of the plug.

Fig. 6 shows the effect of atmospheric humidity on electrode temperature and sparking voltage.

Fig. 7 shows the maximum conductance allowable for a given sparking voltage and coil to break down the gap.

Fig. 8 shows the effect of electrode temperature on sparking voltage.

Fig. 9 shows gasoline consumptions of an automobile with dirty plugs and clean plugs respectively.

The foregoing review of fouling factors shows how complex the spark-plug fouling process usually is and how complicated the analysis of the results of the tests.

Budd Develops New All-Steel Body Construction

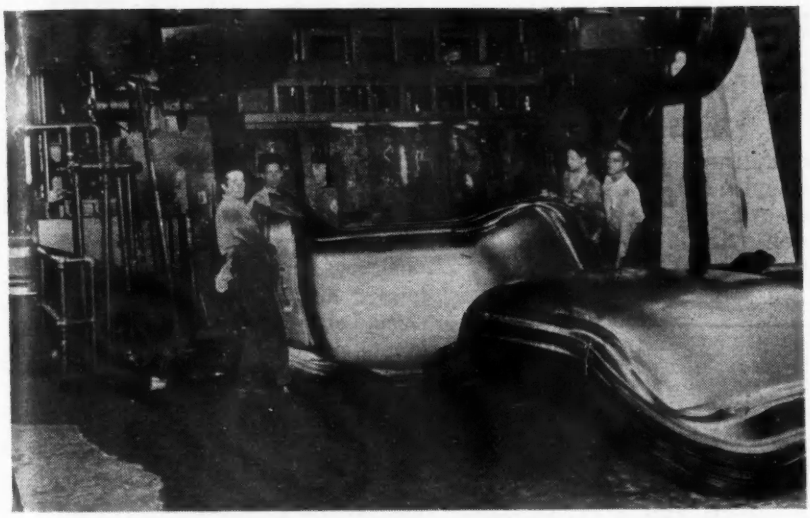


Fig. 1—This view shows the first forming operation after blanking

FOLLOWING the publication of the details of the new all-steel body construction developed by the E. G. Budd Mfg. Co. (AUTOMOTIVE INDUSTRIES, October 26, 1935), we give here some of the details of the huge top stamping produced for the 1936 Studebaker line. It is made from a blank 69 x 133 in. and the stamping weighs 41 pounds.

This top panel is really more than a roof panel since it includes the windshield opening and cowl top panel at the front end and takes in the rear window at the rear. This formation is a logical development of techniques evolved at Budd for some of the largest body stampings in the industry, among them being the Studebaker President side panel.

Despite its unusual size, this stamping does not require a huge triple-action press. In fact the largest press involved is a Toledo No. 796½ having a pressure of about 386 tons. The largest die required in the set-up weighs about 141,000 lb. or a little over 70 tons.

We are told that all of the skill and ingenuity of the organization was taxed to produce this stamping without "worms" or wrinkles. Die design and die spotting had to be worked out with greatest precision to make the stamping surface smooth and free of dings. Incidentally, metal finish on a stamping of this size would be a costly operation, if it were required.

Fig. 1 shows the first forming operation after blanking; Fig. 2 shows the second draw and trim on the big press. Between the two presses, the large areas at the extreme ends of the windshield opening were annealed by means of a gas flame to facilitate the stretching of the panel as well as to prevent tearing or cracking at the corners.

This brief high spot is an interesting commentary on the technical progress in the body industry, indicating the highest development of a difficult art. —J. G.

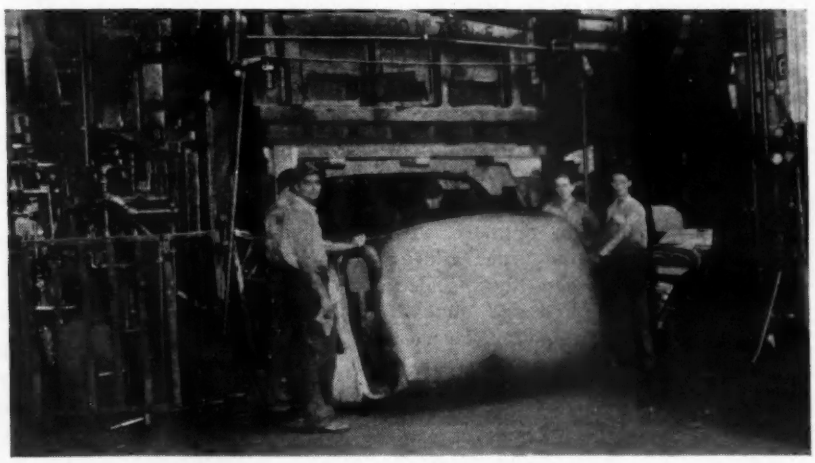


Fig. 2—Here can be seen the second draw and trim on the big press

Trends in Large Air-Engine

TRENDS in large aircraft engine design were discussed in two papers presented at the 1935 National Technical Aeronautical Meeting of the Aeronautic Division of the American Society of Mechanical Engineers, held recently in St. Louis. One of these papers was on Military Aircraft Engines of the Future, by Ford L. Prescott, Senior Mechanical Engineer (Research) of the Powerplant Branch, Materiel Division, U. S. Air Corps. The other was on Large-Engine Development, by Harold Caminez and F. N. M. Brown, of the Allison Engineering Co., Indianapolis, Ind. It is generally known that the Allison Engineering Company is working on the development of an aircraft engine of large output.

Mr. Prescott said the practical arrangements of cylinders in aircraft engines fall into two groups, radial and in-line. Each of these groups at present divides into a few simple classes, as shown in Table I.

Table I

Radial		In-Line	
Five-cylinder	Single Row	Twelve-cylinder	Vee
Seven-cylinder	Single Row	Twelve-cylinder	Opposed
Nine-cylinder	Single Row	Sixteen-cylinder	X
Twelve-cylinder	Hex.	Eighteen-cylinder	W
Fourteen-cylinder	Double Row	Twenty-four-cyl.	X

The twenty- and twenty-eight-cylinder types are also attractive in some respects, using five or seven radial banks of four cylinders in line, with liquid cooling. The five- and seven-cylinder radials are useful only in smaller sizes, while the nine- and fourteen-cylinder engines appear capable of development to 1000 hp. or more, with air cooling. The in-line types appear at best advantage when liquid-cooled. The twelve-cylinder Vee and opposed types at present seem to offer the most in the 1000 and 1200 hp. class. It is often said that the limit of horsepower has been reached for air cooling, or that it will be impracticable to handle more power in a single engine. However, there is no indication that the end has been reached in either of these matters. Large military engines, if successfully air-cooled, offer advantages in freedom from plumbing troubles and reduced vulnerability which should not be overlooked. It may be said that blower cooling would reduce the power available at the propeller. This may be a good "fault," since the derivation of cooling air flow from forward speed is doubtless less efficient than the use of a well-designed blower, and the weight/power ratio of propellers goes up rapidly as the power is increased. The latter point shows little promise of improvement since consideration of propeller tip speed necessitates large propellers and reduction gearing. In 1918 a 420 hp. metal propeller weighed 120 lb. or 0.286 lb. per hp. In 1935 a 1000 hp. metal propeller (controllable) weighs 450 lb. or 0.45 lb. per hp. Incidental to the large propeller of today is a reduction gear, adding 60 to 100 lb. to the powerplant weight. On the other hand the dry weight of the 1918 engine was 845 lb. or 2.01 lb. per hp., while that of the 1000-hp. engine of today will not exceed 1200 lb. or 1.2 lb. per hp. including the 60 to 100 lb. of reduction gearing mentioned previously.

In the matter of supercharging, the built-in geared blower appears to be indispensable. Without multi-speed drives, however, this form of supercharger does not satisfy the demands of altitude performance, especially above 15,000 ft. For altitudes of 35,000 ft. or higher, the exhaust turbo compressor offers the most efficient means of maintaining sea-level performance, with the geared supercharger supplying the ground boost. There is also something to be said for a separate engine-driven blower for maintaining altitude performance. The problem of synchronizing several engines would be reduced by operating them from a single source of air maintained at sea-level pressure. Incidentally, the problem of accessory drives and mounting could be simplified by centralizing the accessories not vital to the operation of each engine unit. The present tendency in powerplant design is toward high r.p.m. and high b.m.e.p., since both factors tend toward high output per cu. in. or per lb.

The military aircraft engine of the immediate future will have a rating of 1000 to 1200 h.p., with an emergency rating some 10 per cent greater. The dry weight will be 1.2 lb. per b.hp. or less, including reduction gearing. The b.m.e.p. will be 185 to 200 lb. per sq. in., obtained with a geared, built-in, centrifugal compressor. Ignition will be by means of high tension magnetos. The number of cylinders will be 12 for the Vee or opposed types, with liquid cooling, and 9 or 14 for the radial air-cooled types. Crankshaft rotational speed will be 2500 to 3100 r.p.m. The fuel consumption at rated power will not exceed 0.5 lb. per b.hp.-hr. in the liquid cooled types, and at cruising, will be .45 lb. per b.hp.-hr. or less. Fuel

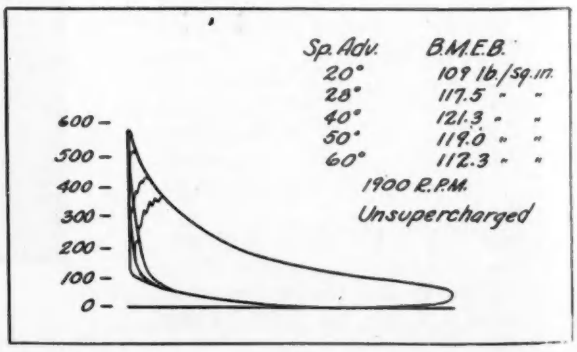


Figure One

Design Discussed at a Symposium

injection will probably be used, so that mixture distribution will be uniform, The direction of rotation will be optional, so that the torque in a two engine installation will be balanced. For single engine installations, dual propellers rotating oppositely will be required because of torque considerations. A single propeller handling 1200 hp. at 1200 r.p.m. requires a torque of 5000 lb.ft. To resist this torque by wing rigging entails sacrifice in the matter of drag, hence the methods of eliminating torque outlined above. Propellers will, of course, be fully controllable in the interest of take-off load, speed, and fuel economy. Sea-level performance will be maintained at altitude by means of the exhaust turbo-compressor. Developments in the Diesel field may alter the above outline, but this matter is at present one of speculation. The tell-tale plume of smoke from the Diesel-type engine will have to go before serious competition with the Otto cycle type can occur in the military field. The weight handicap of the Diesel is not serious, provided the fuel consumption can stay 10 to 20 per cent lower than in the Otto type.

Treading lightly into the more remote future, indications are that 1500 to 2000 hp. per engine will be demanded. Weight per hp. will be still lower than in the 1000-2000-hp. field, running possibly from 1 lb. down to 0.8 lb. per b.hp. Liquid cooling will be used, with low drag or blower-cooled radiators, or in the case of air-cooling, by means of blowers and pressure-type cowling. Cylinder size will not exceed 6 in. bore, and 18 to 24 or more cylinders will be required. High output per cu. in. and some form of compounding may result in lowering of the fuel consumption. Improved fuels may also permit raising the compression ratio without destructive detonation. Dual propellers with opposite rotation will be more essential than in the case of the 1000 to 1200-hp. class. The question of larger propellers, or more small ones, will call for settlement, and the whole topic of propulsion may require new analysis, because of the airplane speeds which will be the rule. Predictions along this line must come from better qualified persons, who are more closely related to the subject of propulsion.

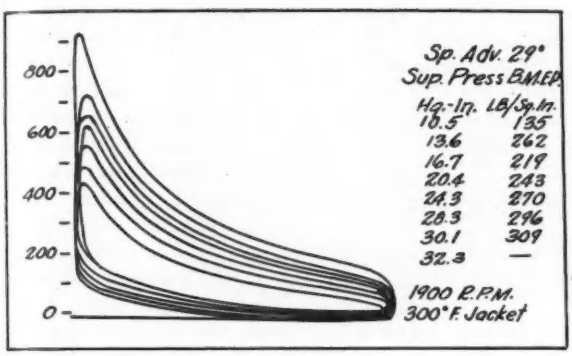


Figure Two

A few frontier-marks which have been established may be of interest. In the matter of b.m.e.p., the indicator cards shown in Fig. 1 to 6 appear to indicate that it will be possible to greatly increase the output per cu. in. by high degrees of supercharging, provided improvement in fuels and spark-plugs is sufficiently advanced. It may be mentioned that Fig. 6 was taken under unstable conditions, and represents several efforts to hold the output steady while securing the card. It is believed that this card represents a record for cylinder performance and also for indicator performance. A b.m.e.p. of 579 lb. per sq. in. (actual) was recorded. Fig. 5 was taken at 539 lb. per sq. in. and the operation of the engine was steady. Fig. 4 shows an excellent

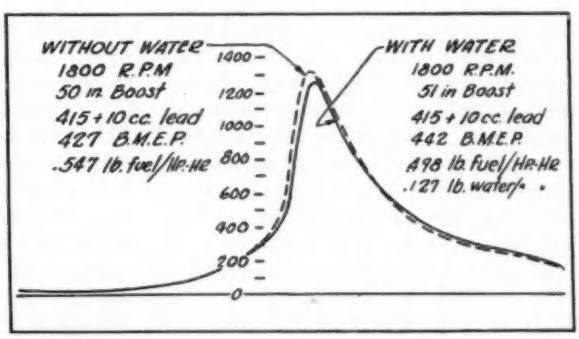


Figure Three

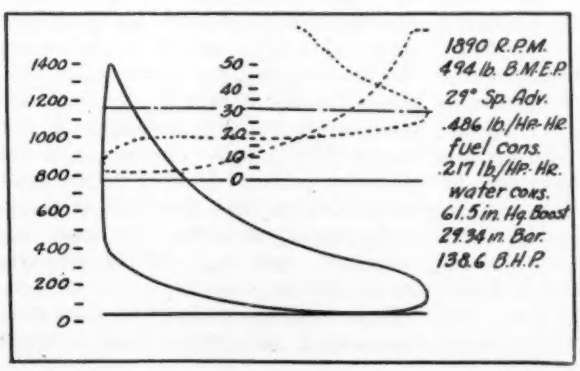


Figure Four

weak-spring card at 494 lb. per sq. in. b.m.e.p. while Fig. 3 shows the effect of knock suppression by water injection. Energy is absorbed during the period of rapid pressure-rise, but definitely appears to be available during the working stroke. It seems probable that dissociation and recombustion take place in the cycle, with increase in thermal-efficiency, since no changes were made in engine adjustments other than to admit the water. The shift in boost pressure of 1 in. of mercury column accounts for 5½ to 6 lb. b.m.e.p., leaving 9 lb. per sq. in. to be accounted for by increased combustion efficiency. The gain in b.m.e.p. is about 2 per cent, while the gain in brake thermal efficiency is 9 per cent. Fig. 2 is a record of a spark plug test terminating with pre-ignition. The apparently high i.m.e.p. of the pre-ignition card is not readily explainable, since it was accompanied by a loss in brake load.

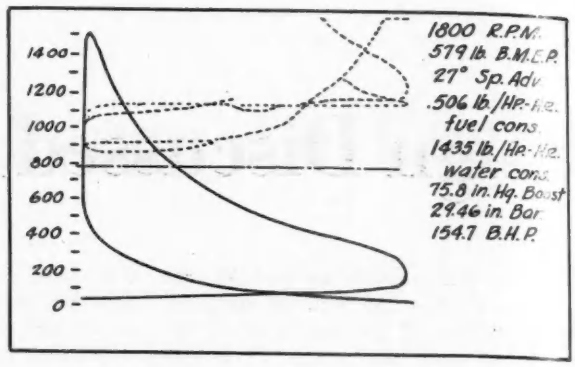


Figure Six

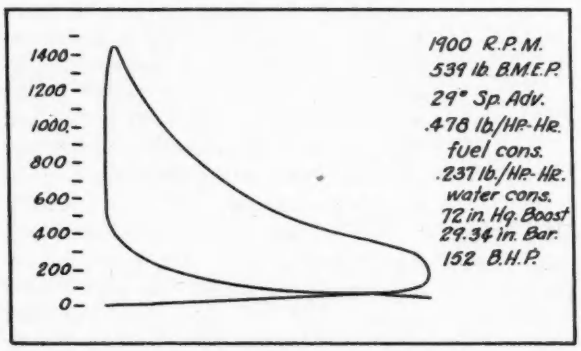


Figure Five

Fig. 1 shows the effect of spark advance at low output. The record performance of Figs. 3-6 was attained with poppet valves of the internally cooled type. Such valves have operated satisfactorily at engine speeds as high as 3400 r.p.m., indicating that valve gears for the present are not a limiting factor in high output per cubic inch. New developments in the line of fuels are making possible higher brake mean effective pressures, and high rotative speeds with ample bearing areas and counterbalancing are actually producing lower unit bearing loads than have recently been the rule in aeronautical engines. The requisite displacement per minute is at present being obtained from cylinders of moderate size. How far it will be possible to go along the present lines, before developing new types of powerplant, is at present not known.

* * *

Messrs. Caminez and Brown in their paper made the assertion that the present demand in the aircraft field is for engines of not less than 1000 hp. rated output, and that this rating must correspond to the output the engine is capable of delivering for 60 hours on end. The weight must not exceed 1.2 or 1.3 lb. per hp. If the engine is intended for a long-distance two-engined transport, then the cruising power will be about one-half the rated power, and at this load the specific fuel consumption should not exceed 0.4 lb. per hp.-hr. Thermal-stress problems increase in difficulty with the cylinder dimensions, for which reason it is necessary to limit the bore to about 6¼ and the stroke to 7½ in. This gives a displacement of 230 cu. in. and makes it possible to develop 100 hp. per cylinder. Ten such cylinders would develop the required 1000 hp., but 10 is not a desirable number. If twelve or fourteen are chosen the cylinders can be made correspondingly smaller and a choice made of four available cylinder arrangements, viz., two banks of six cylinders radially arranged; two banks of seven each, radially arranged, a flat arrangement with twelve opposed cylinders and a 60-deg. V-12. The authors think that the V-12 is to be preferred as involving the least development cost and the fewest disadvantages in use.

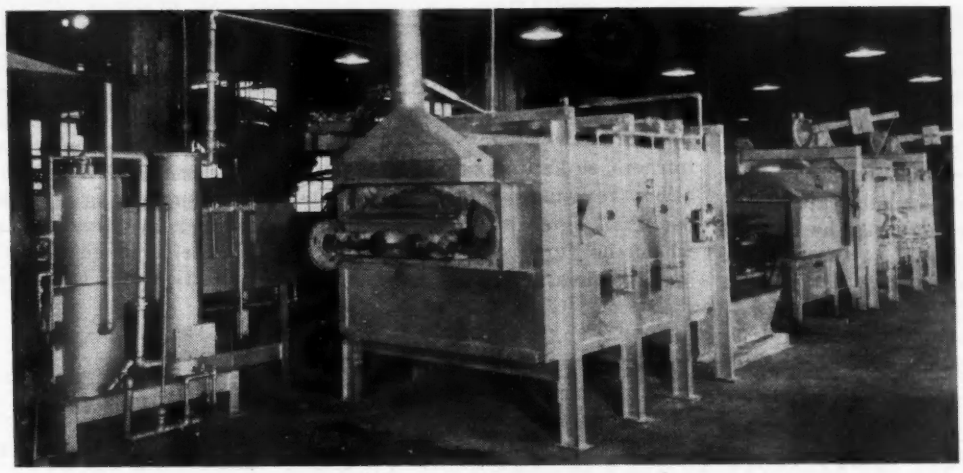
Four cooling media are available, viz., vapor, air, water and a high-boiling-point liquid such as ethyl glycol. The authors listed the advantages and disadvantages of each system and came to the conclusion that there are two outstanding advantages in favor of high-temperature liquid cooling that outweigh all of the factors in favor of air cooling: First, that it is possible to control cylinder-head temperatures at a cost of little more than 0.2 lb. per b.hp. so as to permit the use of high compression ratios and, second, that free flight conditions can be maintained at little cost on the torque stand. These two advantages, the authors thought, were sufficient to cause the engineer to select high-temperature liquid cooling.

With the number of cylinders, their arrangement and the kind of cooling decided upon, the engineer can proceed to engine details. The selection of 12 cylinders instead of ten of the maximum practical size permits of a reduction in the displacement. With a compression ratio of 6 and a speed of 2500-2600 r.p.m., and some boosting to improve the volumetric efficiency, the displacement required should be in the neighborhood of 1700 cu. in. This calls for a cylinder of about 5½ by 6 in.

Gearing is, of course, necessary to prevent low propeller efficiencies. The ratio may vary from 3:2 to 2:1, depending on the rated r.p.m. of the engine. Spur gearing would probably be selected because of its simplicity. In view of the trend toward high altitude-flying and as an aid in the elimination of vibration, some form of manifold injection device should be used, instead of a carburetor. This would also reduce the specific fuel consumption.

With the general lay-out of the engine settled the designer is at once faced with a host of minor problems. All of these problems must be attacked from the standpoint of "How little can it weigh?" The complete answer to this question can be found only on the torque stand, where low weight and reliability may be balanced against each other.

Packard Has Installed Completely Mechanized Heat Treating Units



A view of the new heat treating unit in the Packard plant

COMPLETE mechanization of the metallurgical process of heating, quenching and drawing steel parts has been achieved in an installation at the plant of the Packard Motor Car Co. The heating, moreover, is accomplished in an atmosphere that is claimed to prevent scaling. Heretofore the nearest approach to complete mechanization have been units requiring one operator to load the work from the quench onto the conveyor of the draw furnace. The unit eliminates this manual operation and requires only a single operator to charge the hardening furnace.

The entire length of the unit, including the two furnaces and quench and wash tanks, is only about 30 ft. and yet it has a capacity for 40 rear axle shafts (496 lb.) every hour. The hardening furnace encloses an alloy muffle which is filled with reformed city gas. Axles are progressed through by twin screws, motor driven, and this system of conveying is unique in heat-treating technique.

This setup, including furnaces, conveyor systems, DX gas reforming unit, etc., was developed and built by the Surface Combustion Corporation, Toledo, Ohio. The hardening furnace is 52 in. wide and 85 in long, inside dimensions, but the muffle is a few inches longer. An aperture in the bottom of the rear end of the furnace, closed with an air tight housing—an extension of the alloy muffle—down into the quench, is employed to lower the work into the quenching medium. The shafts fall onto a mechancially operated lowerator which carries them down into the quench and drops them gently onto the quench tank conveyor.

The furnace casing is of welded steel plates, braced with structural steel shapes, and the walls are lined with 4½ in. of insulating firebrick and 4½ in. of insulation. The arch consists of 9 in. of insulating firebrick. The alloy muffle is 3½ ft. wide and 3 in. high to the spring line of the arch of the muffle, and attached to the discharge end is the alloy housing, already mentioned, in which the lowerator operates. The muffle rests on alloy rollers supported by a fireclay tile hearth spanning a number of firebrick piers extending transversely across the furnace chamber. It extends beyond the furnace end wall (charging) and has an opening large enough to feed the axle shafts onto the conveyors.

The conveyor system consists of a pair of rotating screws, and the work is positioned between a pair of correlated flights of each screw and rests upon four alloy supporting rail members attached to the muffle, the rails being arranged along both sides of each screw. As the screws are rotated, the work supported by the rail members advances. The two screws are geared together and driven from a common drive shaft. The quench-tank conveyor and the draw-furnace conveyor are also driven from the same main drive shaft by a ¾-hp. power motor.

The lowerator consists of a pair of levers fixedly mounted on a common shaft, located outside the furnace, and a pair of alloy carrying arms attached to the lower ends of the levers. The hot axle shafts are caught by the ends of these arms, as they leave the screws. As the lever shaft is rapidly turned, one axle shaft is rapidly swung down into the quench and gently deposited on the quench-tank conveyor. This conveyor automatically moves the shafts and places them on the wash-tank conveyor, which in turn places them on the draw-furnace conveyor.

The movement of the lowerator is then reversed and the carrying arms are restored to their formal position inside the alloy housing. The oscillatory motion of the lowerator is produced by a motor-driven thrustor, the plunger of which is connected to the lowerator lever shaft by means of a counterweighed cam and link arrangement. Axle shafts and lowerator movements are synchronized by a time cam arrangement positioned on the main drive shaft, that actuates a limit switch which opens and closes the electrical

circuit connected to the lowerator thrustor. When the cam contacts the switch, it closes the circuit and keeps it closed until the lowerator has completed its down swing, when the circuit is broken. The counterweights attached to the lowerator shaft cause the carrying arms to return to the loading position.

The hardening furnace is heated by a number of SC standard high pressure, two-stage, velocity-type burners, so located along both side walls as to fire both over and under the muffle. Gas is furnished to the burners at from 10 to 15 lb. pressure. Desired temperatures are mechanically maintained by an automatic temperature controller in circuit with a motor-operated valve, of the on-and-off-type, in the gas-supply line to the burners.

The quench tank is fabricated of ¼ in. steel plates welded together, and is 6½ ft. long at the top, 4 ft. wide and 2¾ ft. deep. It contains an elevator conveyor of the chain type, operated by a roller-chain drive direct-connected through a pair of bevel gears to the main drive shaft. A spray-type washer, heated by steam coils, is located between the quench tank and the draw furnace. It consists of a steel tank equipped with a chain-type conveyor operated by the same drive as the quench-tank conveyor. By means of it the quenched axle shafts are passed through the hot wash and then placed on the draw furnace conveyor.

The draw furnace, also of steel and refractory construction, is 10 ft. long and 4¼ ft. wide, inside dimensions. Heat is supplied by SC standard high-pressure, two-stage velocity type gas burners, so located as to fire above and below the conveyor in the furnace chamber. Pilot lights insure positive ignition when the furnace is operated at low temperatures. The same type temperature control as already described is used on this furnace. This unit is capable of heating work within a range of 500-1000 deg. F. and has the same capacity as the hardening furnace.

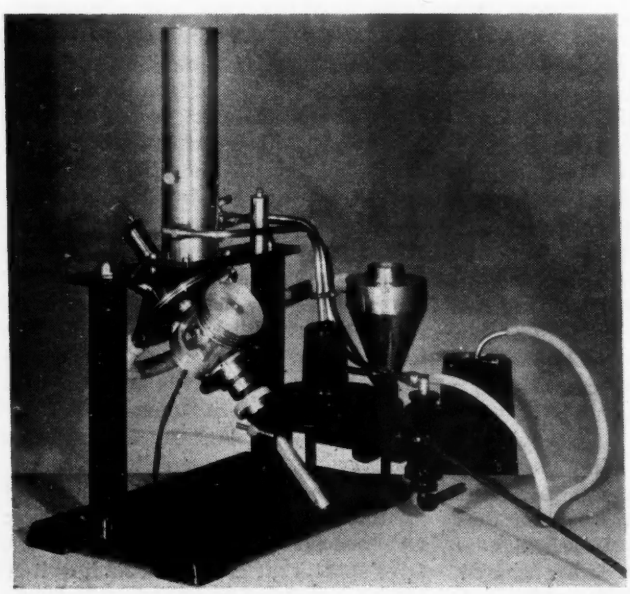
The steel casing of this furnace is lined with 4½ in. of insulation backed up with 1½ in. of Superex insulation. Refractory-lined doors of cast iron and of the lift type are provided at both ends of the furnace, and these are raised and lowered by hand-operated hoists. The conveyor consists of looped chains suspended between sprockets at both ends of the furnace. Both ends of the conveyor are outside the furnace chamber, to form loading and unloading platform, and the return of the conveyor is outside beneath the furnace. The conveyor is driven through one of the supporting sprockets (the other idling) by a roller-chain drive direct connected through a worm-gear speed-reduction unit to the main drive shaft.

Abrasimeter Measures Wear Resistance

ALTHOUGH the Abrasimeter, an instrument designed to measure the abrasion or wear resistance of hard coatings, was originally developed for the inspection and control of aluminum oxide piston coatings, its uses now extend to the checking of any type of coating including, varnishes, lacquers, synthetic finishes and many electroplates. It operates by removing a small area of the coating by what has been termed an accurately controlled sand blast.

The instrument is made by the B. R. Haueisen laboratories, Indianapolis, Ind., and is distributed by Alcote, Inc., Detroit, Mich. According to an announcement by Fred A. Wales, president of Alcote, the Abrasimeter is standard equipment in the laboratories of Cadillac, Buick, and Olds for the examination of oxide-coated aluminum alloy pistons.

With most coatings, such as varnishes, lacquers, and many electroplates, the endpoint of the test is indicated by the appearance of a contrasting spot as seen through the magnifying eyepiece. However, in the examination of oxide coatings on aluminum and its alloys, the inherent insulating properties of the aluminum oxide are utilized. During this test frequent contact is made on the area under abrasion with a feeler and when the oxide has been removed an electrical circuit is closed, indicating by means of a light the termination of the test.



The latest type Abrasimeter is operated by an ordinary air-line

The latest type of instrument is illustrated here. The long cylinder at the top carries the charge of 180 grain alundum shot with which the specimen is bombarded. This material is fed at the rate of 20 grams per minute through a controlled carboloy orifice under air pressure of one pound per sq. in. The shot is recovered and stored in the cone-shaped container at the right.

This device makes use of the ordinary shop air line, regardless of its pressure and reduces the pressure to a standard of 10 lb. per sq. in. by passing it through a diaphragm valve. This pressure is further reduced to 1 lb. in the chamber above the specimen, excess air being bubbled through a water chamber shown at the extreme right.

Depending upon the way this instrument is used, the data it produces may be rated either in grams of shot required to uncover the coating or the time required for the operation. This instrument opens an entirely new field in accelerated testing of coatings of many types. J. G.

PRODUCTION LINES

Coming Through End-to-End

Bodies coming through on the Hudson and Terraplane production lines. One line is at capacity now and a second line is being gradually pushed up to full production to help meet the rising tide of orders

Traffic-Wise

Judge John J. Maher, who has achieved a national reputation through his "traffic Court of the Air" on WJR daily, is working on a book. He told us recently that the book will deal with safety education, particularly from the viewpoint of the youth of this country. He expects to get the book in the hands of the educators and hopes to make it a part of the background of children's education, in much the same way as hygiene is taught today. The book should be off the press by February.

Front Wheels

Judging by service records, tire makers are forced to look at wheel alignment in one of two ways—if the original specifications are correct, then evidently some of the new jobs are not as stable as they used to be; or maybe the original specifications on some cars are not absolutely right to start with. Whatever the facts may be, it seems desirable to put some intensive effort behind a study of front wheel alignment, if all interests are to be served. One of the tire companies is on the verge of starting an independent study of its own.

Luxurious Ride

Recently we put in about 300 miles on one of the new 1936 Packard 120's. All in all, it's a fine-performing automobile. The ride is luxurious—not only in its springing but in the upholstery, which is of the best. Steering ease is a revelation, both on the highway and in parking. You will agree it is a comfort to set a good-sized car right up against the curb in a space just a wee bit longer than the bumper-to-bumper length of the job. Gear shifting is another big surprise. You will recall that Packard changed the shifter mechanism so as to cut down the travel. It takes practically no movement, relatively speaking, to shift from one gear to another. What with the increased engine rating, it's possible to shift from first directly to high in the twinkling of the eye, and get away from most anything around you.

Budgets Sales

The operation of a rather scientific form of sales budget for the merchandising department of General Electric is outlined by Lee Schoenfeldt in the *Executives Service Bulletin* for October. Probably its most interesting feature is the use of the statistical method for setting up indexes and quotas. However, instead of using mathematical analysis, they have resorted to a graphical method which is simple and relatively easy to apply. Here is something well worth investigating if you have a national distribution problem.

Torsionmounting

That's the most literal translation we can make of a new trailer construction that was demonstrated to us by a German visitor who holds the patents on this development. Over in Europe they are building gobs of small two-wheel trailers for automobiles, utilizing a most unique design. They are experimenting with the same construction for heavy trailers and semi-trailers for heavy hauling. Briefly, the system comprises an all-welded steel frame in which the side rails immediately at the wheels are long sections of spring steel having definite torsional characteristics. The wheels are mounted on arms instead of the usual axles, the arms being directly attached to the rectangular section spring rails by an ingenious method of shrink fit joints. Wheel movements are controlled by the flexing of the spring side rail sections. We hope you can visualize this from the crude word picture given here. Let us know in case you are interested.

Design for Production

We can't get the die cast grilles off our mind, it seems. However, here is a practical suggestion. Speaking to some of the die casters and platers, we find that manufacturing procedure and costs, of course, could be greatly improved by slight changes in the form and pattern of the casting. Thus, a particular arrangement of cross or vertical bars or both may make it easier to polish—in some cases it may even make the difference between hand polishing or automatic machine polishing. The upshot of it is that you can get what you want at lower cost if you consult with your plater and die caster before the final design is translated into steel.

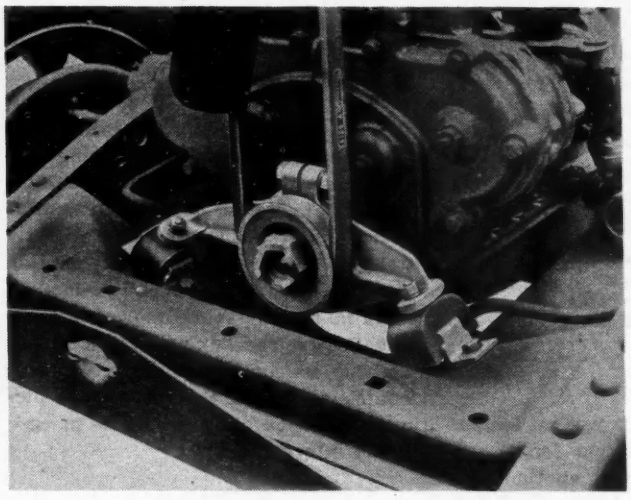
Silver Annual

In honor of its silver anniversary, the Bakelite Corp. has printed a special issue of the well-known *Bakelite Review*. It's a presentation of facts that are of real human interest to you and to me. It covers the history of Bakelite; high spots of the Bound Brook plant; Bakelite in industry; and a little dope on new developments. You'll want a copy of this booklet.

—J. G.

MANUFACTURING MANAGEMENT METALLURGY

New Propeller Shaft Intermediate



New engine mounting with rubber blocks and drop-forged front support

IN announcing its 1936 truck models the Diamond T Motor Car Company stresses a further development of streamline style as well as improvements in load distribution, spring suspension, driver comfort, and ease of handling. All Diamond T truck designs are originated and carried to completion by C. A. Tilt, president of the company.

Hercules engines are continued in substantially the same displacements for the different carrying capacities as in the past. A new four-point rubber engine mounting has been developed, which is clearly shown by one of the accompanying illustrations. Precision-type main bearings, which heretofore have been available only on certain models, are now standard equipment on the entire line.

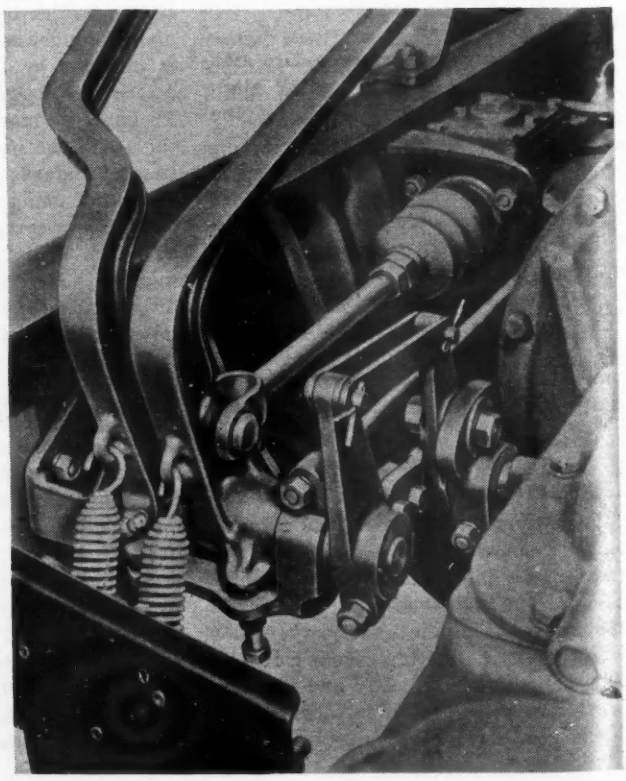
Engines have been moved forward on the frame, to a position well over the front axle, which, besides improving the riding qualities, provides greater payload space for a given length of wheelbase. It also increases the proportion of the total load carried on the front wheels. This change has also increased the available cab space. The minimum wheelbase of Models 212A to 228 has been increased from 135⅛ in. to 139¾ in., and a 9-ft. body can now be used even on the shortest wheelbase.

Notable improvements have been made in the design of the de luxe cab. The V-type windshields now have a 30-deg. instead of an 11-deg. slope. Concealed regulators are employed. The adjustable cushions are of greater depth and better quality than heretofore. All cabs are now 60 in. wide, providing ample room for three men, and the cowl width has been increased 2½ in. A steel tool compartment is located below the cab door. Cowl louvres provide additional ventilation control at this point. Ignition, cab door and tool box are all locked with one key.

Frames in general are more rigid than in the past, the cross members particularly being heavier, of improved design, and provided with gussets. Frame stock is increased progressively with the length of wheelbase. Frames for short-wheelbase models are of 3/16-in. stock, those for models of intermediate length, of 7/32-in. stock, and those for the longest models, of ¼-in. stock.

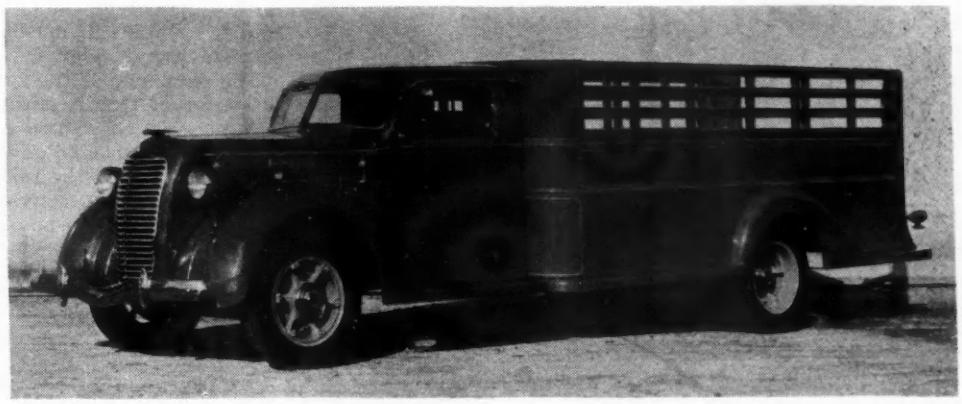
A new type of propeller-shaft intermediate bearing has been adopted, with a Timken double roller bearing flexibly mounted in a block of compressed rubber. The two-piece shaft with bearing carrier and three needle-bearing universal joints has been adopted for all wheelbases.

Wider springs are now provided at both front and rear throughout the line, and a new rear-spring mounting has entirely eliminated shackle lubrication. All front spring shackles and front shackles of rear springs have compression-type rubber bushings. The rear ends of rear springs are free,



Brake and clutch pedals and master cylinder mounted on frame. Note clutch operating linkage

Bearing on Rubber in Diamond T



Diamond T 1½ to 2 ton de-luxe model with dual tires and drop-panel stake body

supporting the frame through wear plates on brackets of special design.

An improved type of cam-and-roller steering gear is used in all models, with cam-follower roller bearing mounted for reduction of friction. Front springs are shackled at the front end to eliminate the tendency to "shimmy" or wheel fight. Lockheed hydraulic brakes with cast drums are continued on all models. A B-K vacuum booster is standard equipment on all but the 212 Series, where it is available as an option. Emergency brakes are of the contracting-band type on the four smaller models. The remainder of the line have the "Tru-Stop" ventilated-disk emergency brake.

Brake and clutch pedals are now mounted directly on the frame, together with the hydraulic master cylinder, which affords additional protection against breakage in the hydraulic lines. It also permits a much closer fit between pedal shanks and floor boards. The new floor boards are of laminated plywood and carry a panel for ready access to the battery.

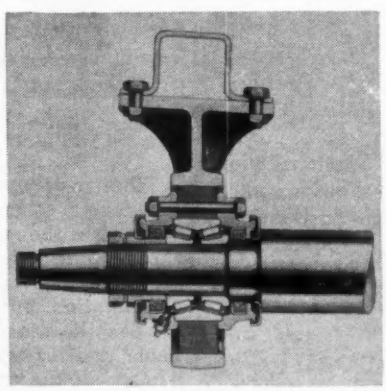
Further refinements have been made in the construction of the "Super-Service" engine, which is supplied as standard equipment on the 2½-4 ton Model 360 and is available as optional equipment on the smaller models. These new engines duplicate the standard powerplant in general design, dimensions and output, but include special features which enable them to meet unusually severe operating conditions. The 1936 "Super-Service" engines have counterbalanced crankshafts of chrome-molybdenum steel, precision-type main and connecting-rod bearings of cadmium-nickel alloy, and an H-W filtrator combined with an oil cooler.

An electrically-welded pressed-steel gasoline tank of 30 gal. capacity is supplied on all models. Reduced chassis maintenance cost is aimed at by an increased use of leak- and vibration-proof flexible tubing and standardization of gas-line and hydraulic-brake-line union fittings.

The deep-crowned fenders are die-formed in one piece. Fender shields are provided to permit ready access to engine tappets. Fenders, hood, radiator shell and cab are attractively finished in oven-baked red enamel with green band.

De luxe models carry a chrome-plated radiator grille and ornament, a spring-bar bumper, an ornamental ventilating grille with frame of stainless steel, double-beam headlamps with foot control, and a de luxe instrument panel with electrically-operated clock and cigar-lighter. Instrument board and panel, steering gear and controls are finished in green. The speedometer and gages are of the airplane type. Standard equipment includes a gasoline gage, an oil gage, a temperature indicator, and a stop light.

The new Diamond T line consists of thirteen chassis, headed by the Model 212-A (which replaces the current 211-A), and the Model 212-B, carrying a heavier Clark 8001 rear axle instead of the Clark 373, with which Model 212-A is equipped. The maximum gross capacities of these two 1½-2 ton models are 11,000 and 11,500 lb. respectively. Larger models of the Diamond T 1936 line parallel the current series, while the largest models, of 3-4, 4-5, and 5-6½ tons rating, are continued without change.



(Left): Driveshaft intermediate bearing. (Right): Cross-section of rubber-mounted driveshaft intermediate bearing

AUTOMOTIVE ABSTRACTS

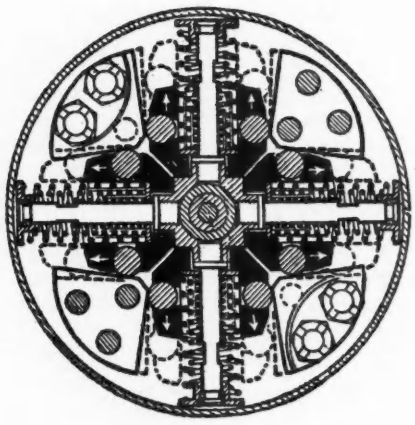
Automatic Injection Advance

A BRITISH firm specializing in the manufacture of injection pumps for high-speed Diesel engines has developed a governor which automatically varies the injection advance in accordance with the speed of the engine. This governor, known as the Bryce-Belfrost All-Speed, is only 5 in. in diameter and gives an injection-advance range from 2.5 to 10 deg. for pumps operating between 200 and 1000 r.p.m. The whole mechanism is enclosed between two circular disks, of which one is the driving and the other the driven member of the pump coupling. A light cylindrical cover is securely fastened to one and turns freely on the other disk.

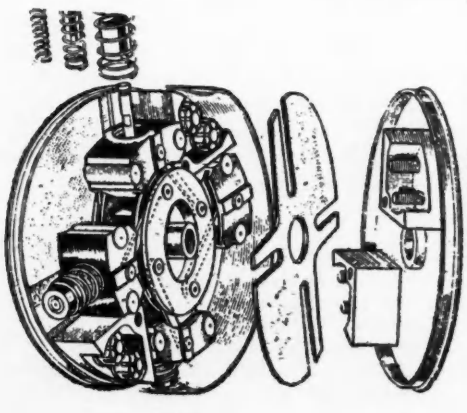
Advance of injection is effected by means of four centrifugal weights made of bronze, under the influence of coil springs. At the sides of the centrifugal masses there are long steel rollers which contact with four sector-shaped blocks of hardened steel, arranged as shown by the sketch. One pair of these blocks, arranged opposite each other, is rigidly secured to the driving part of the coupling, the other to the driven part. The centrifugal masses are accurately machined and their motion, which is guided by slots provided in a plate covering them, is such that it results in a rotation of the coupling in the direction of the hands of a watch. Three coil springs control the motion of each of the centrifugal weights.

The outer one of the springs, which is relatively weak, is the only one that is effective at low speeds. As the speed increases the other two come into action successively, and a nearly straight-line governor characteristic results. However, by changing the relative strengths of the springs and the profiles of the active faces of the blocks, any desired "advance curve" can be obtained. There is said to be very little wear on the moving parts of the governor and the only attention required by it is lubrication every 6000 miles.

The drawings are reproduced from *Motor Transport*.



All-Speed injection - advance governor disassembled



Sectional view showing parts in position corresponding to full advance

Reverse Flow Scavenging Tests on DKW Two-Stroke Engine

COMPARATIVE tests of a new DKW two-stroke engine with what is known as reverse-flow scavenging and another engine of the same make with the conventional cross-flow scavenging have been made at the Internal Combustion Engine Institute at Hannover Technical College. A vertical section through the engine with reverse-flow scavenging and a cross section of same on the line *C-D* are shown in Fig. 1. The conventional system of cross scavenging is well known, the gaseous charge, precompressed in the crankcase, entering the cylinder through a transfer passage and transfer port at one side of the cylinder at the bottom of the stroke, the transferred charge being directed upward by a deflector on the piston head and sweeping the products of the previous combustion before it, out through the exhaust port located opposite the transfer port. The principal specifications of the two engines are given below:

	88 x 76 mm. Engine Reverse-Flow Scavenging	68 x 68 mm. Engine Cross-Flow Scavenging
Normal speed	3000 r.p.m.	3000 r.p.m.
Nominal power	11 hp.	6 hp.
Cylinder bore	3.46 in.	2.67 in.
Piston stroke	2.99 in.	2.67 in.
Displacement	28 cu. in.	15 cu. in.
Useful displacement	22 cu. in.	11.7 cu. in.
Compression space	4.8 cu. in.	3.8 cu. in.
Charge volume	26.8 cu. in.	15.5 cu. in.
Compression ratio (on basis of useful displ.)	5.57	4.10
Compression ratio (on basis of total displ.	6.85	5.00
Depth of exhaust ports	0.662 in.	0.591 in.
Depth of transfer ports	0.394 in.	0.457 in.
Exhaust lead (in.)	0.267 in.	0.133 in.
Specific capacity of exhaust port (sq. in.-deg. per cu. in.)	3.82	5.02
Specific capacity of transfer port	2.52	4.52
Specific exhaust-lead capacity	0.13	0.045
Specific capacity of inlet port	3.37	5.73
Exhaust back pressure (const.) in in. of water.	4.53	2.75

What is demanded of a scavenging system is an effective scavenging of the combustion chamber of gases of combustion with the minimum loss of the scavenging medium through the exhaust ports. In a way the effectiveness of scavenging is indicated by the b.m.e.p. and the specific fuel consumption, but these are influenced also by other factors besides the scavenging efficiency, so that they are not reliable indices of the effectiveness of scavenging. The b.m.e.p. of the engine with reverse flow scavenging at 3000

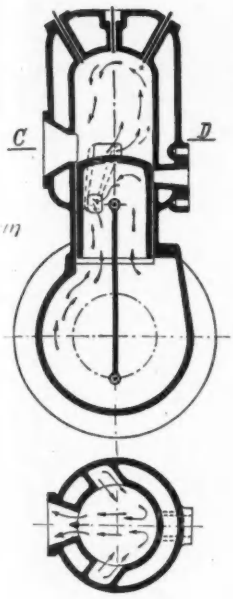


Fig. 1—Vertical and horizontal sections of DKW two-stroke engine with reverse-flow scavenging

r.p.m. was 57 lb. per sq. in., that of the engine with cross flow scavenging, 43 lb. per sq. in. The specific fuel consumption at 3000 r.p.m. was 0.815 lb. per hp-hr. with reverse-flow scavenging and 1.05 lb. per hp-hr. with cross-flow scavenging.

An important factor in the operation of two-stroke carburetor engines is the quantitative efficiency of scavenging, which is defined as the ratio of the combustible mixture retained in the cylinder to that actually delivered to the engine. This scavenging efficiency increased with the speed in both engines. In the one with reverse-flow scavenging it attains a value of about 86 per cent at 3000 r.p.m. while in the engine with cross-flow scavenging it is only about 75 per cent at the same speed. At 2000 r.p.m. the values are about 82 per cent and 68 per cent respectively.

Fig. 2 shows a combustion diagram from the engine with reverse flow scavenging at 3000 r.p.m. under normal load of 11 hp. Gas samples were taken from the engine at definite intervals from 60 deg. beyond bottom center to 60 deg. ahead of bottom center and the samples were analyzed for CO_2, CO and O_2. The dotted vertical line which intersects the O_2 line at the point where it begins to drop denotes the point of ignition, which appears to be 26 deg. ahead of top center. It will be seen that the oxygen decreases in almost direct proportion with time from this point on and that combustion is nearly complete with the crank in the dead center position.—*A.T.Z.*, Sept. 10.

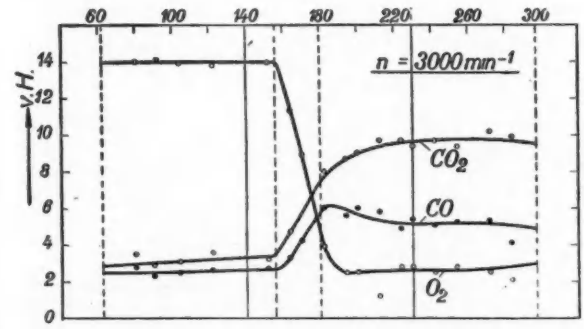
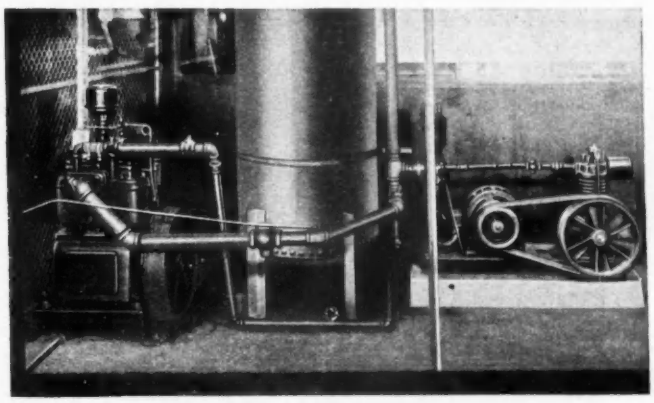


Fig. 2—Combustion diagram of engine at 3000 r.p.m. under full load

The vertical scale is in per cent and the horizontal scale in crankshaft degrees from the lower dead center

Efficiency is built into CURTIS COMPRESSORS



Curtis Compressors at the Parker Pen Co., Janesville, Wis., supply 60 cu. ft. of air per minute at a cost of only 12¢ per hour.

The outstanding efficiency of Curtis Compressors results in lowered air costs and freedom from expensive shutdowns, with correspondingly greater profits. With these objectives in mind, Curtis has been building fine compressors for 41 years. Experience makes it possible to produce the highest *consistently* efficient performance in industrial compressors.

Check these Curtis advantages: Timken Roller Bearings. Carbon-free Disc Valves. Centro-ring Oiling. Fully Enclosed. All Parts Readily Accessible. Capacities up to 360 CFM. Send for detailed bulletin C4B.

Write for surveys giving facts and figures on Curtis installations which have brought substantial savings to other manufacturers.

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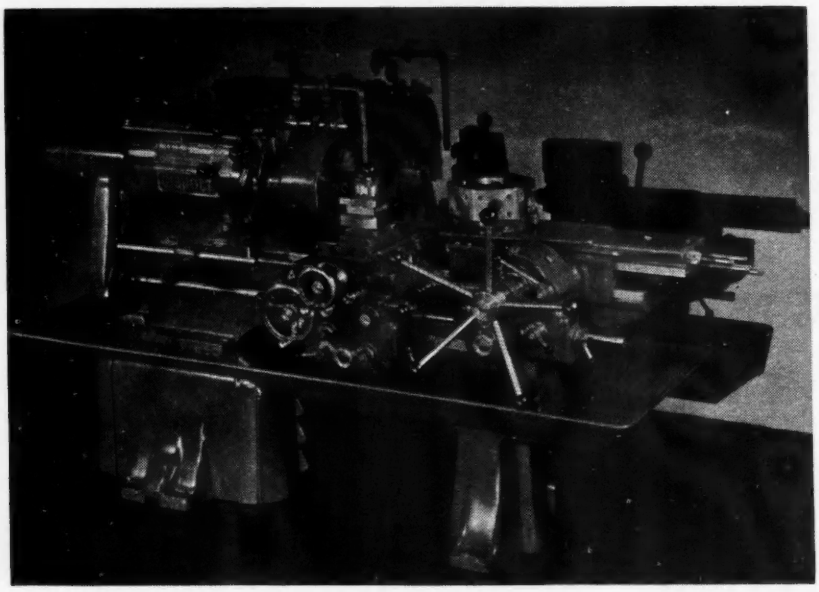
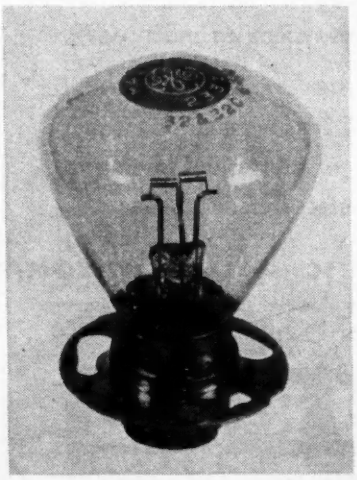


Gisholt ram type turret lathe

New Bar-Filament Headlight Bulb

The Incandescent Lamp Department of the General Electric Co., Cleveland, Ohio, has recently developed a new Mazda headlight bulb which is being used on several of the 1936 cars. The new bulb is said to differ considerably from the older types in that the filaments, instead of being V-shaped and placed one above the other, are in bar form and are located side by side with one slightly higher. In switching from the driving position, both headlight beams are simultaneously shifted to the right and are lowered somewhat, which is said to give better illumination along the right-hand side of the road and at the same time to reduce the glare for oncoming drivers.

This bulb with its prefocused base is known as Mazda No. 2331.



G. E. bar-filament lamp bulb

Gisholt Announces Three New Lathes

The new Gisholt ram type turret lathes are said to be adaptable to either high production work or small lot jobbing. The three new machines are identical in design and construction, differing only in size and capacity. They will handle from 1½ to 2½ in. bar stock and have from 8 to 15 in. chucking capacity.

The hexagon turret and its stop roll are automatically indexed to the next position with the back movement of the ram slide. As the ram slide goes forward to the work, the hexagon turret is automatically located and clamped in place. The quick indexing square turret on the cross slide is arranged for holding four tools, a single lever being provided for indexing, locating and clamping.

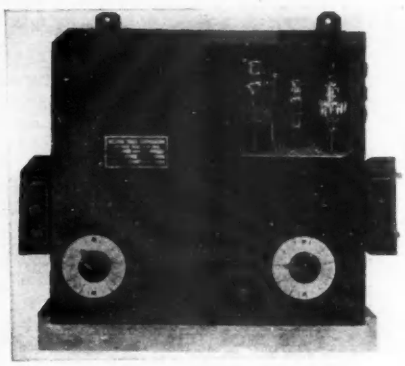
The selective gear transmission permits a change in spindle speed without passing through intermediate speeds. Three levers control the 12 speeds available. The shift from high to low speed, as from drilling to reaming or from turning to threading, is made through multiple disc clutches and is done without stopping the spindle.

These lathes are a product of the Gisholt Machine Co., Madison, Wis.

Welco Welding Timer

The Welding Timer Corp., 251 Ogden St., Newark, N. J., announces a line of electro-mechanical timers for spot welding. The device consists of an electronic timing element and a set of balanced contactors specially designed to handle the high overloads encountered in spot welding.

Welco timers are said to make possible accurate timing at between one and two cycles. Standard settings cover a range from one to 30 cycles, and dial settings permit an infinite variation of times between the maximum and minimum. The correct combination of low welding time, pressure and power is said to make possible the successful spot welding of aluminum, brass, copper, stainless steel and other metals. Welco timers are made in standard sizes of 30, 50, 150, 250 and 600 amperes.

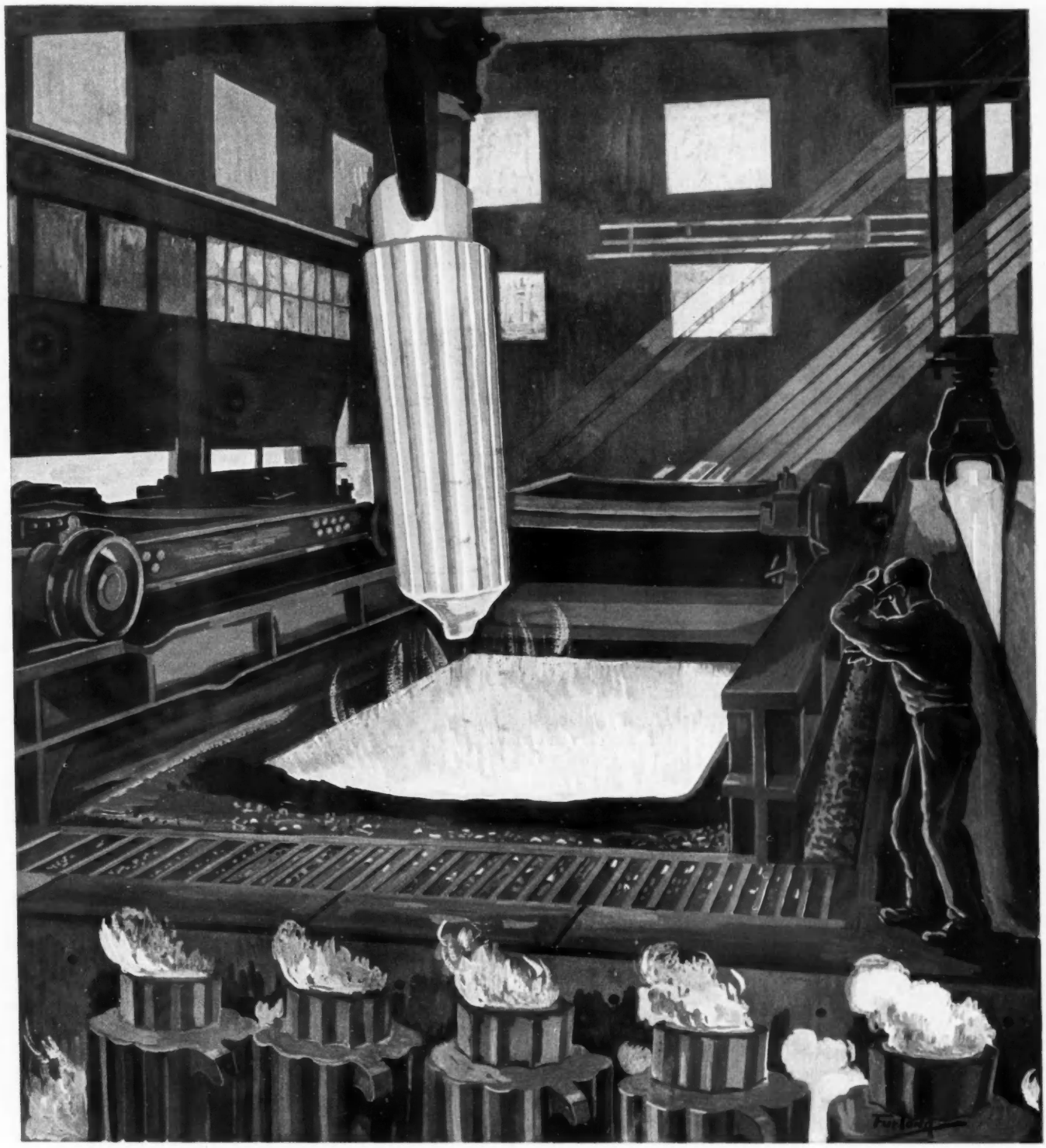


150 amp. welding timer

New Monroe Products

Spraytex is a new noise-deadening material being introduced by the Monroe Auto Equipment Co. of Monroe, Mich. It is used on the inside of the body, fenders, doors, etc., and is said to entirely dissipate the noises and

(*Turn to page 771, please*)

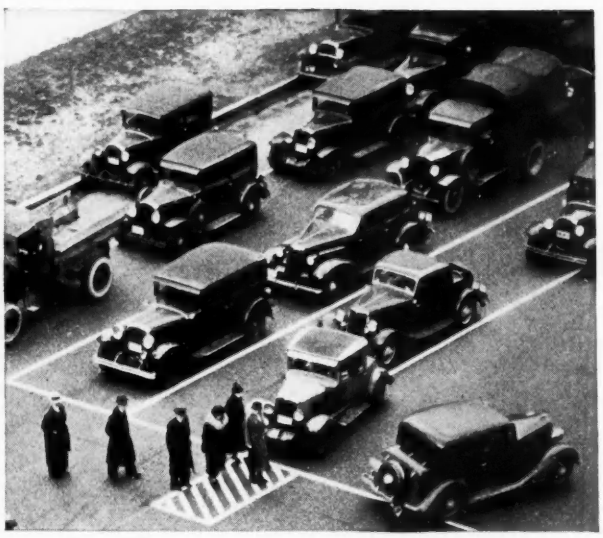


THE soaking pit receives the hot ingot and brings it throughout to the precise temperature that is most suitable for the intended rolling or other working. Reheating in the soaking pits is but one of the many steps in steelmaking where the "know-how" assures the intrinsic quality and uniformity of the finished product.

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

BETHLEHEM STEELS
for the Automotive Industries



AUTOMOBILE SHEETS

THE tendency toward drawing operations of greater severity and increased stamping speeds call for carefully worked-out adjustments in the physical properties of the sheets that go into today's automobiles, in definite relationship to die-press operation.

While one drawing operation may seem much like another, seldom does a sheet of given properties lend itself equally well to both. Operations that appear similar are likely to be subtly modified in different plants calling, in turn, for modifications in the physical properties of the sheet that is used.

Naturally, the basic factors of quality in automobile sheets, such as excellence of finish and uniformity of physical properties, are always essential. But again and again body manufacturers who use Bethlehem Automobile Sheets find an added factor of value in the assistance Bethlehem can give in adjusting physical properties of sheets to stamping requirements.

It is Bethlehem's ability to make inherently fine sheets, combined with the skill and experience that are essential in adjusting their properties to meet specific requirements, that is responsible for the preference of so many body makers for Bethlehem Sheets.

ALLOY STEELS

USERS of Bethlehem Alloy Steels benefit continuously from the large amount of data on alloy steel performance, both in service and in heat-treating, forging, machining, and other processes of automotive production, that has been accumulated during Bethlehem's long experience in the production of alloy steels.

SILVERY MAYARI ALLOY IRON

SILVERY Mayari Alloy Iron produces fine-grained, readily machinable high-strength castings at low cost through its natural nickel and chromium content, combined with silicon content of from 9 to 12 per cent. A very small percentage of Silvery Mayari is required in the cupola mixture to effect improvement in automobile cylinder blocks.

Because of its economy and unusual effectiveness, Silvery Mayari is now being used in the cylinder-block castings for leading makes of automobiles.

SPECIAL-PURPOSE CARBON STEELS

BETHLEHEM is particularly well equipped to supply Special-Purpose Carbon Steels suited to the needs of automobile manufacturers. Physical properties are accurately adjusted to meet requirements of use. Such adjustments include control of grain size, when so ordered or specified.

SPECIAL ROLLED SECTIONS

FOR years Bethlehem has been developing special rolled sections, many of which have been especially designed for the requirements of automotive builders. The use of these sections as a method of parts-making has brought economies to many manufacturers.

TOOL STEELS

EVERY detail in the manufacture of Bethlehem Tool Steels is handled in the way that long experience has shown to result in the finest product. For each of the many exacting tool-steel uses in the automotive industry there is a grade of Bethlehem Tool Steel that will meet every demand.

STAINLESS STEELS

BETHADUR and Bethalon, covering practically every requirement for stainless steels, including the free-machining grades.

STEEL WIRE

BOLT and screw wire; spoke wire; spring wire.

BOLTS AND NUTS

BETHLEHEM has a large, self-contained plant devoted wholly to the manufacture of bolts, nuts and related products, and producing a complete range of standard items, and many "specials".

Bethlehem District Offices are located at Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, San Antonio, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Salt Lake City, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

New Developments

(Continued from page 768)

rumbles common to automobile bodies.

Another Monroe product is the "Silent" connecting link for shock absorbers. All joints are encased in rubber to prevent squeaks and rattles. Lubrication is never necessary.

New Type Carburetor

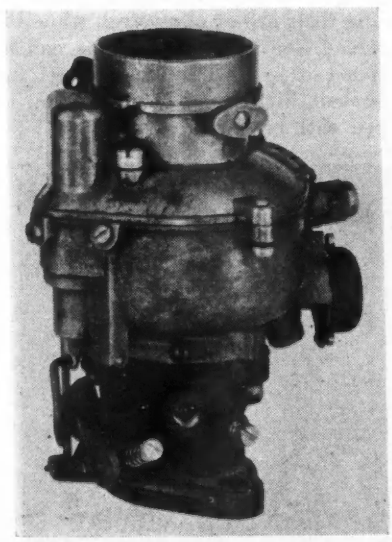
A new type of carburetor incorporating some novel features of construction has been placed on the market by the Chandler-Groves Co., Detroit, Mich.

The 1¼-in. model is illustrated here, the accelerating pump being shown at the left, the vacuum economizer at the right. The usual low speed adjustments are provided. One of the most important features of this unit is the concentric float mechanism, the float being of horseshoe form, hinged at the right, the chamber and float completely encircling the central venturi. The spray nozzle is pointed downward at the center from the underside of a central tube.

It is claimed that the use of concentric float mechanism aids in producing improved and uninterrupted distribution particularly on up and down-grades and in fast cornering, where there is a tendency to starve the main jet under the action of centrifugal force.

The vacuum economizer is of diaphragm type, independent as to operation and adjustment from the metering system. The idling system does not necessitate reversal of fuel flow in transferring from low to high-speed settings, which is said to improve operation at the transfer point.

The entire design has been so developed as to simplify construction, and it is claimed that there are no moving elements which, through wear, might cause the carburetor to become less efficient in operation.

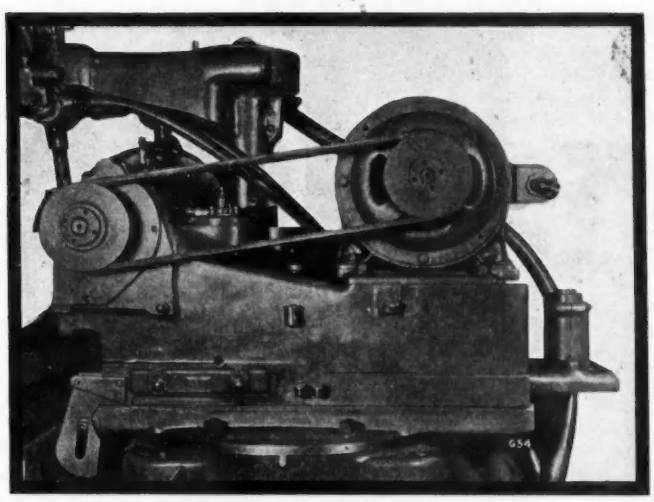


New carburetor of the Chandler-Groves Co.

New Udylite Products

The Udylite Co. of Detroit, Mich., manufacturers of polishing and plating equipment supplies, has introduced ball-type anodes for copper, brass and zinc plating. The container illustrated is filled with ball anodes, and, as they corrode, their area decreases and they pack closer at the bottom, making room for new ones to be added at the top. This is said to keep the metal content of the plating solution at all times at the desired strength as a constant anode area is maintained. Since even the smallest pieces are used, the scrap losses are eliminated.

Another new product just announced by The Udylite Co. is a buffing and polishing wheel in which a special pre-treatment is given to the cloth before



Now!

there is

A WHEEL BASE

Not like those ordinarily found on Universal Grinders. Much heavier. Better proportioned. More efficient power delivery to the grinding wheel. Force feed wheel spindle lubrication. Wide ways, well spaced. Automatic hydraulic wheel feed.

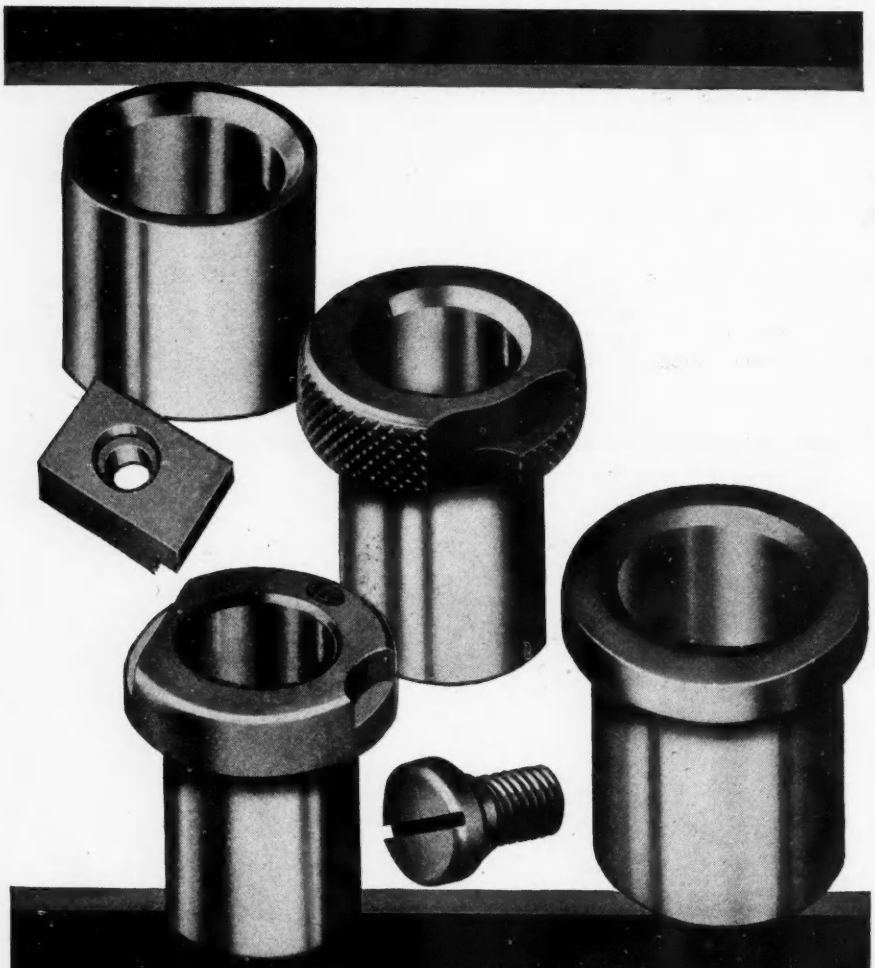
That's the Landis Type C 14" Hydraulic Universal wheel base. It not only has these Plain production grinder features but also a swivel and slide making it fully universal.

From end to end these machines are just as sturdy and modern as the wheel base. The result is they are capable of grinding a wide variety of work within a close degree of accuracy and at a speed not associated with Universal machines.

174

LANDIS TOOL CO.

WAYNESBORO, PA.

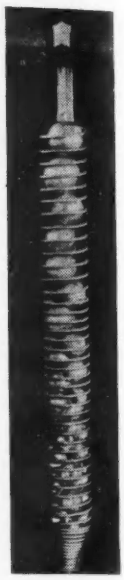


EX-CELL-O DRILL JIG BUSHINGS

Furnished in a wide range of sizes, both clamp and screw types. 250,000 bushings carried in stock! Complete stocks in both New York and Detroit. Data sheet and price list upon request.

EX·CELL·O

AIRCRAFT & TOOL CORPORATION DETROIT. MICHIGAN



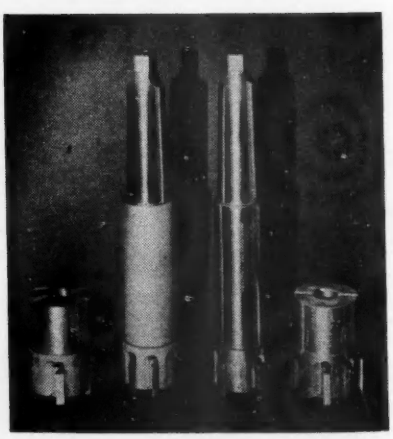
Container with ball type anodes

it is made up into sections. This pretreatment is said to consist of introducing the proper moisture content into the fibers of the cloth to give it maximum tensile strength and wear-resisting qualities. Udylite humidified buffs are available in all sizes, types and styles of sewing.

Renewable Blades for Boring Tools

The Ingersoll Milling Machine Co. of Rockford, Ill., announces that its Zee lock cutter blade is now available for multi-blade boring tools. The cutters may be reground to size by inserting the renewable blade in the next slot, which moves out the blade only part of a serration, minimizing the amount of regrinding necessary. From eight to 36 adjustments or resizings are possible with one set of blades.

Ingersoll Zee lock drills and reamers are furnished in either the shank or shell type as shown. The bodies of the boring tools are of alloy steel, while the Ingersoll Zee lock cutter blade can be supplied of forged high-speed steel, super-cobalt high-speed steel, stellite, or tipped with cemented carbide.



Ingersoll Zee lock reamers